

Drug rationality profile in diabetes mellitus patients

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ABSTRACT

Diabetes mellitus was a metabolic disease characterized by hyperglycemia that occurred due to the inability of the pancreas to secrete insulin, impaired insulin action, or both. According to Riskesdas data (2018), the prevalence of diabetes mellitus in Jember district was in third place. The increased prevalence was caused by one of them, namely the result of inappropriate drug use. The rationality of the drug could be seen from the accuracy of the type of drug, dosages, patient, dosage of each drug. The purpose of this study was to determine the rationality profile of drugs in patients with diabetes mellitus. This type of research was an observational study with a cross-sectional design. The data collection technique used random sampling, with the number of samples in the study being 43 samples. The sample in this study was medical record data of diabetes mellitus patients. The instruments used in the study were patient medical records, hospital formularies and data recapitulation sheets. Data was processed descriptively displayed in the form of frequency and percentage. The results showed that the accuracy of the drug was 95,35%, the accuracy of the dosage was 100%, the accuracy of the patient was 100%, the accuracy of the drug indication was 95,35%, so it was concluded that the rationality of the drug was 97,67%. Drugs were given based on indications, doses, drugs, and patient conditions. Physician provided drug therapy according to hospital procedures that referred to the hospital formulary.

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1. INTRODUCTION

Diabetes mellitus (DM) was a metabolic disease characterized by hyperglycemia that occurred due to the inability of the pancreas to secrete insulin, impaired insulin action, or both. Long-term damaged and failure could occur in various organs such as the eyes, kidneys, nerves, heart and blood vessels when in a state of chronic hyperglycemia (1).

DM was not only caused death worldwide. This disease was also a major factor caused cardiovascular disease such as blindness, heart disease, and kidney failure. The International Diabetes Federation (IDF) organization estimated that at least 463 million people aged 20-79 years in the world suffer from DM in 2019, or the equivalent of a prevalence of 9.3% of the total population at the same age. The IDF (International Diabetes Federation) also identified the number of DM sufferers in residents aged 20-79 years in several countries which have been recorded in the 10 countries with the highest number of sufferers namely China, India and the United States which rank in the top three with the number of DM sufferers of 116, 4 million, 77 million and 31 million. Meanwhile, Indonesia was ranked 7th among 10 countries with the number of DM sufferers, namely 10.7 million. (2). East Java Province is ranked fifth with the number of DM sufferers ≥ 15 years of 75,490 residents. Patients with DM in men amounted to 36,877 residents and women 38,613 residents. Meanwhile, based on DM prevalence data diagnosed by doctors in residents of all ages in Jember Regency, 6,092 people (3).

The goal of DM therapy was reduced and eliminated symptoms (polyuria, polydipsia, polyphagia), reduced the incidence of macrovascular and microvascular complications, reduced mortality and improved quality of life, lower blood glucose levels under normal conditions (4). The management of type 2 DM was modification of the patient's lifestyle, good blood glucose control, and regular follow-up. Medicines for type 2 DM patients were oral hypoglycemic drug groups,

sulfonylureas, meglitinides, alpha-glucosidase inhibitors, biguanides, thiazolidinediones, DPP4-inhibitors and SGLT-2 inhibitors (5). For insulin therapy there were short acting insulin, intermediate acting insulin and long acting insulin.

Pharmaceutical services were one of the benchmarks used as a guideline for pharmaceutical staff in administering pharmaceutical services. Pharmaceutical services aimed to improve the quality of health services, quality and achieve rational drug use. Pharmaceutical services at this time was a service that shifts its orientation from drugs (drug oriented) to patients (patient oriented). The role of pharmacists in pharmaceutical services was very important, including pharmacists must understand and be aware of the possibility of medication errors and drug-related problems. Pharmacists must also monitor drug used and monitor therapeutic effects needed when carrying out clinical pharmacy service activities (6).

The high incidence of DM and the importance of proper handling need to be treated rationally. Rational treatment for patients was very important in order to achieve quality of life in patients. Currently the rationality of drug use was still a major problem in the world of health. Drug rationality was an action that must be in accordance with several aspects of accuracy, namely the right diagnosis, the right indication of disease, the right choice of drug, the right dose, the right choice of patient condition and alertness to side effects (7). Irrational use of drugs can lead to increased morbidity and mortality in patients (8).

The results of research conducted at Indonesian hospitals showed that 78.2% of geriatric patients experienced drug-related problems during their hospitalization. Due to drug-related problems, the prevalence of the disease has increased (9).

2. METHOD

The purpose of this study was to determine the profile of drug rationality in patients with diabetes mellitus. This research was conducted at a hospital in one of the Jember districts for the 2021 period. The sample in this study was medical record data from patients with diabetes mellitus who met the inclusion criteria. The inclusion criteria in this study were medical record data of patients with diabetes mellitus with accompanying 2021 period with age more than equal to 18 years and receiving antidiabetic drugs. This type of research was an observational study with a cross-sectional design. The data collection technique used random sampling, with the number of samples in the study being 43 samples. The sample in this study was medical record data of diabetes mellitus patients. The instruments used in the study were patient medical record data, data recapitulation sheets, and hospital formularies. Rationality in this study was seen from the accuracy of the drug, patient, dosage, drug indication. Accuracy of drugs and doses by comparing the hospital formulary. The accuracy of the indication was seen from the doctor's diagnosis accompanied by the condition of the complaint that occurs. While the accuracy of the patient results from the doctor's diagnosis. Data was processed descriptively in the form of frequency and percentage. This research obtained ethically proper information from 22003/KEPK/UDS/II/2022 by KEPK University of dr. Soebandi.

3. RESULTS AND DISCUSSION

a. Gender

Gender characteristics in inpatients diagnosed with type 2 DM with other diseases at a Jember hospital in 2021 period can be seen in the following table

Table 1. Demographic patient medical record data based on gender

Gender	Number of patients	Percentage (%)
Male	14	32,56
Female	29	67,44
Amount	43	100%

Based on the results of the study in table 1, it was known that the number of patients diagnosed with type 2 DM with other diseased in 2021 was 14 people with male sex (32.56%), while the number of women was 29 people (67.44%).

b. Age

Age characteristics of type 2 DM with other diseases at a Jember hospital in the 2021 period, based on age it is divided into four groups, where the classification is 40-49 years, 50-59 years, 60-69 years, and 70-79 years as shown in table 2 below:

Table 2. Demographic patient medical record data based on age

Age (years)	Number of patients	Percentage (%)
40-49	10	23,25
50-59	21	48,84
60-69	11	25,58
70-79	1	2,33
Amount	43	100%

Based on the results of the calculations above, it could be seen that there were 43 patients with type 2 DM with other diseases hospitalized at a Jember hospital in 2021. In this study, the most ages diagnosed with type 2 DM with ulcers were at the age of 50-59 years with a total of 21 patients with a percentage of 48.84%, second place at the age of 60-69 years with 11 patients with a percentage of 25.58%. 40-49 years as many as 10 patients with a percentage of 23.25% and aged 70-79 years as many as one patient (2.33%).

c. Diagnosis

The results of this study are related to the diagnosis of disease with other diseases and both can be seen in the table 3:

Table 3. Demographic patient medical record data based on diagnosis

Diagnosis DM with	Number of patients	Percentage (%)
hypertension	26	60,46
heart	11	25,58
Hypertension and heart	6	19,95
Amount	43	100%

The results of the study in table 3 were type 2 DM patients with hypertension having the largest percentage of 60,46%, then with the second highest number being type 2 DM with a heart of 25,58% and followed by type 2 DM with hypertension and both hearts of 19,95 %.

d. Use of oral antidiabetic drugs

Based on the results of data collection on the use of type 2 DM drugs, it could be seen in the following table:

Table 4. Demographic patient medical record data based on use of oral antidiabetic drugs

Class	Drug type	Amount of patients	Percentage (%)
Sulfonilurea	Glibenklamid	7	7,53
	Glimepiride	17	18,28
	Glikuidon	2	2,15
	Glikazida	1	1,08
Biguanid	Metformin	21	22,58
Thiazolidindion	Pioglitazone	2	2,15
Inhibitor α -Glucosidase	Acarbose	5	5,38
	<i>Rapid acting</i>	Novorapid	19
<i>Long acting</i>	Actrapid	8	8,60
	Levemir	10	10,75
	Sansulin	1	1,07
		93	100%

The most widely used oral antidiabetic was the biguanide class, namely metformin in 21 patients (22.58%). The second most widely used antidiabetic drug was the second generation sulfonylurea, glicimepiride, in 17 patients (18.28%). In this study, the most commonly used short-acting insulin was novorapid in 19 patients (20.43%) and the long-acting insulin was levemir in 10 patients (10.75%).

e. Use of Single and Combination Antidiabetic Injection Drugs

Based on the results of data collection on the used of type 2 DM drugs, it could be seen in the following table:

Table 5. Demographic patient medical record data based on use of single and combination Antidiabetic Injection Drugs

Class	Jenis Obat	Amount of patients	Percentage (%)
Monoterapi	Inj. Novorapid	2	4,65
	Inj. Actrapid	1	2,32
Combination	Inj. Novorapid + Acarbose	1	2,32
	Inj. Levemir + Glicimepiride	2	4,65
	Glicimepiride + Pioglitazone	1	2,32
	Inj. Novorapid + Inj. Novorapid	2	4,65
	Inj. Actrapid + Glicimepiride	1	2,32
	Glicimepiride + Metformin	5	11,63
	Glikuidon + Metformin	2	4,65
	Inj. Novorapid + Metformin	6	13,95
	Inj. Actrapid + Glibenklamid	2	4,65
	Inj. Novorapid + Glibenklamid	3	6,98
	Inj. Levemir + Glibenklamid	1	2,32
	Inj. Novorapid + Glikazida	1	2,32
	Inj. Actrapid + Inj. Sansulin	1	2,33
	Inj. Levemir + Inj. Actrapid	1	2,33
	Metformin + Acarbose	1	2,33
	Inj. Actrapid + Metformin + Glicimepiride	2	4,65
	Inj. Levemir + Glibenklamid + Inj. Novorapid	1	2,33
	Inj. Levemir + Inj. Novorapid + Metformin	3	6,98
	Glicimepiride + Metformin + Acarbose	1	2,33
	Inj. Novorapid + Metformin + Glicimepiride	1	2,33
Inj. Levemir + Glicimepiride + Metformin	1	2,33	
Amount		43	100%

Based on the calculation results from table 5, it could be seen that the distribution profile of the most frequently used single antidiabetic drug was insulin novorapid in two patients with a percentage of 4.65% and the most common antidiabetic drug combination was insulin novorapid and metformin in six patients with a percentage of 13.95%.

f. Accuracy of drug

Drug accuracy was the suitability of choosing a drug among several types of drugs that have indications for DM disease that have been established in standard literature, namely the hospital formulary.

Table 6. Percentage of Accuracy of Drugs Based on hospital formulary

Accuracy of drugs	Amount	Percentage
Accurate	41	95,34
Not accurate	2	4,66
Amount	43	100

The results of the study on table 6 stated that out of 43 patients, 41 patients (95,34 %) had the right medication, while two patients (4,66 %) had the wrong medication.

g. Accuracy of drug indication

Accuracy of indication was the suitability of drug use with the patient's clinical needs as seen from the patient's diagnosis, symptoms or complaints. In this study, the table of drug indication accuracy in type 2 DM patients can be seen as follows;

Table 7. Percentage of Accuracy of drug indication

Accuracy of drug indication	Amount of patients	Percentage (%)
Accurate	41	95,34
Not accurate	2	4,66
Total	43	100%

Based on the calculation results in table 7, it was found that the accuracy of the indications was 41 patients with a percentage of 95,34%, while the wrong indications were 2 patients with a percentage of 4,66%, this was due to drug incompatibility with complaints that led to the patient's diagnosis.

h. Accuracy of patient

Patient accuracy was the drug given to the right patient according to the doctor's diagnosis. In this study, the table of Accuracy of patient in type 2 DM patients can be seen as follows;

Table 8. Percentage of Accuracy of patient

Accuracy of patient	Amount of patients	Percentage (%)
Accurate	43	100
Not accurate	0	0
Total	43	100%

Based on the calculations in table 7 was showed a patient accuracy of 100%. Patient accuracy was the drug given to the right patient according to the doctor's diagnosis.

i. Accuracy of drug dosage

Dosage accuracy was the drug given according to the patient's condition dosage which referred to the hospital formulary. In this study, the table of Accuracy of patient in type 2 DM patients can be seen as follows;

Table 9. Percentage of Accuracy of drug dosage

Accuracy of drug dosage	Amount of patients	Percentage (%)
Accurate	43	100
Not accurate	0	0
Total	43	100%

Based on the calculations in table 9 shows that the dosage accuracy is 100%. Dosage was indicated by the name of the drug along with the strength of the accompanying drug.

The results of the study showed that drug inaccuracies were found in patients with diabetes mellitus who received thiazolidinedione (TZD) class therapy, namely pioglitazone, which was not recommended for patients with a diagnosis of heart failure. The TZD group has side effects that could increase the risk of heart failure by 1.2-2 times, causing hypoglycemia, weight gain and edema (10). Mechanism of peripheral edema, especially in patients taking concomitant insulin (which may itself caused some increase in interstitial fluid). An increase in plasma volume in a small drop results in a hemoglobin concentration due to hemodilution. Whereas the second drug inaccuracy was found in patients who received antibacterial class drugs, namely cefoperazone injection, the results of laboratory data and clinical data of the patient did not show an infection. The addition of cefoperazone injection does not match the patient's diagnosis and complaints.

Medication inaccuracies can affect type 2 DM patients. This can reduce the patient's quality of life, increased treatment costs and caused unwanted drug reactions. So that drug inaccuracies can lead to unsuccessful therapy and have a negative impact on patients. To prevent this from happening, it was necessary to use the right drug in accordance with the guidelines for the management of type 2 DM, to reduce the negative impact on patients. The results of research on the use of monotherapy drugs in type 2 DM patients with complications of hypertension, heart disease or both were actrapid insulin preparations, namely eight (19.51%), belonging to the class of short-acting insulin with a mechanism of action similar to insulin produced by humans. The short-acting insulin group was chosen as the first drug to treat elevated blood sugar in patients with HbA1C values > 8% or GDS 183mg/dL. The choice of this group is in accordance with the American Diabetes Association (11), that insulin was given as basal insulin for the first time. Basal insulin given is human insulin. The human insulin given is short acting and intermediate acting according to the dose needed by DM patients.

Inaccurate drug indications caused unwanted events that can befall patients resulting in therapy failures which were called Drug Related Problems (DRPs) (12). The problem of inaccurate drug indications occurs due to several things such as indications of untreated disease or presence of drugs without indications of complex regimens, factors of medical personnel and errors in drug delivery to patients. The use of antidiabetic drugs in table 5 that was most widely used was the biguanide class with the drug type metformin, namely 21 patients (22.58%). May be used in combination therapy with other antidiabetic drugs. The mechanism of action of metformin was that it works by lowering blood sugar levels through insulin target cells in the liver, muscle and fat by increasing cell sensitivity to insulin. Metformin also works by reducing gluconeogenesis in the liver so that it can lower fasting blood sugar levels (13). metformin was widely used as an option because it has advantages such as tolerability, the price was not too expensive, the effectiveness of reducing HbA1c, did not cause hypoglycemia and its ability to be combined with other antidiabetic drugs (14). Patient accuracy and dosage accuracy in this study was 100%, this indicated that health workers had implemented hospital procedures according to the hospital formulary (15). The results showed that the accuracy of the drug was 95.35%, the accuracy of the dosage was 100%, the accuracy of the patient was 100%, the accuracy of the drug indication was 95.35%, so it was concluded that the rationality of the drug was 97.67%. Drugs were given based on indications, doses, drugs, and patient conditions. Physician provided drug therapy according to hospital procedures that referred to the hospital formulary.

4. CONCLUSION

The results showed that the accuracy of the drug was 95.35%, the accuracy of the dosage was 100%, the accuracy of the patient was 100%, the accuracy of the drug indication was 95.35%, so it was concluded that the rationality of the drug was 97.67%. Drugs were given based on indications, doses, drugs, and patient conditions. Physician provided drug therapy according to hospital procedures that referred to the hospital formulary.

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