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Prescribing Profile of Inpatients with Type 2 Diabetes Mellitus in a Public Hospital at Cengkareng Jakarta

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ABSTRACT: Hyperglycaemia is a medical condition characterized by elevated glucose levels, which may be a feature of several diseases, particularly diabetes. It is also a feature of several other conditions. Diabetes mellitus (DM) represents a significant global health concern. The objective of this study was to ascertain the prescribing patterns and the appropriateness of the use of diabetic drugs in patients with Type 2 Diabetes Mellitus at Rumah Sehat Untuk Jakarta Cengkareng Hospital. This research employs a cross-sectional, retrospective data collection method and uses medical records from January to April 2023. A total of 105 patients met the inclusion criteria and were included in the study. The majority of patients were female, 56 (53.3%), and within the 56-65 age 38 (36.2%). The majority of prescriptions were for parenteral drugs, including fast-acting insulin medications such as Insulin Aspart, which were prescribed to 18 (17%) patients. The prescription of antidiabetic drugs in accordance with the PERKENI 75 standard was deemed appropriate in 75% of cases. The appropriate prescription of medication will result in a reduction of patient glucose levels and an improvement in quality of life.

KEYWORDS: Antidiabetes; HbA1C; Prescribing Profile; PERKENI.

1. INTRODUCTION

Epidemiological studies show that the incidence and prevalence of type 2 DM is increasing in many parts of the world, which is characterized by hyperglycemia, a medical condition in which glucose rises higher than normal and is a feature of several diseases, especially diabetes, in addition to several other conditions. Diabetes mellitus (DM) is currently a global health threat. Based on the cause, DM can be classified into 4 groups, namely Type 1 DM, Type 2 DM, Gestational DM and other types of DM [1].

The WHO organization predicts the number of people with type 2 DM will increase significantly in the coming years. The WHO organization predicts that the number of people with type 2 DM will increase significantly in the coming years. The World Health Organisation (WHO) estimates that the number of people with type 2 DM in Indonesia will increase from 8.4 million in 2000 to around 21.3 million in 2030. The International Diabetes Federation (IDF) prediction also shows the number of people with diabetes will increase between 2019 and 2030. The number of people with DM will increase from 10.7 million to 13.7 million in 2030. Based on data obtained from medical records, the number of people with DM at the Healthy House for Jakarta RSUD Cengkareng in 2022 was 836 people with Type 2 DM [2].

The treatment of diabetics is divided into two parts: non-medical treatment and medical treatment. The purpose of this treatment is to regulate blood sugar. The profile of antidiabetic medicine use is one of the factors that increase the utilization of treatment by patients. Medicines play an important role in achieving successful treatment of patients, but rational drug use is still a major problem in achieving effective and efficient treatment[2].

The most commonly used antidiabetic group is Biguanide, where metformin has the highest consumption rate (63.44%). The most common therapy pattern is Biguanide Metformin group monotherapy (93.33%), and the most used combination therapy is Sulfonylurea and Biguanide groups, namely Metformin and Glimepiride (40.91%). The suitability of selecting antidiabetic drugs for all patients is said to be in accordance with PERKENI (2021) for as many as 67 patients (76.87%) [3].

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The high morbidity of DM and its complications, the amount of diabetes drug use continues to increase, so the possibility of inappropriate use of diabetes drugs is increasing. Drug use profiling is a process that is carried out continuously in a structured manner to determine the percentage of antidiabetic drug use in a certain scope of treatment and to be in accordance with the use of diabetes mellitus drugs in accordance with applicable guidelines. Guidelines for the Management and Prevention of Adult Type 2 Diabetes Mellitus in Indonesia have been regulated by the Indonesian Endocrinology Society (PERKENI), which was most recently revised in 2021 [2].

Irrational use of drugs contributes to the decline in the quality of therapeutic outcomes [4]. Therefore, medication therapy must be carried out rationally. In the study of Ramdini et al. as much as 96.25% of rational therapy in the treatment of type II diabetes at the Pasir Sakti Community Health Centre [5].

Healthy Home for Jakarta Regional Public Hospital Cengkareng is a Type B Hospital and has many patients with Type 2 Diabetes Mellitus. Therefore, to ensure the appropriateness of drugs, researchers want to know about the profile of the use of antidiabetic drugs because this hospital has complete facilities and services in the treatment of diabetes mellitus, especially in the inpatient mangosteen room. The purpose of this study was to analyze the pattern and appropriateness of Antidiabetic Drug prescribing in Type 2 Diabetes Mellitus patients based on the guidelines of the Indonesian Endocrinology Society (PERKENI).

2. MATERIALS AND METHODS

2.1. Material

The data in this study were taken from the medical records of inpatients with Type 2 DM at Healthy Home for Jakarta Regional Public Hospital Cengkareng from January to April 2023.

2.2. Procedure

2.2.1 Study design, Population, and Sample

The design of this study was cross-sectional with Retrospective data collection techniques from January to April 2023, and the collected patient medical record data were analyzed descriptively. The data collected aims to determine the description of the use of Type 2 DM drugs at Cengkareng Hospital. In addition to medical records, PERKENI was also used as a guideline for analyzing the description of the use of antidiabetic drugs.

2.2.2 Sample Criteria

The inclusion criteria for sampling were patients aged >15 years, male and female, diagnosis of Type 2 DM with or without comorbidities, and patients with medical records that were complete and clearly legible with the use of antidiabetic drugs. Subjects were excluded from the sample if they met any of the following exclusion criteria: forced discharge, patient died

2.2.3 Sample Collection

The sample in this study was the entire population who met the inclusion criteria with the sampling technique using the purposive sampling method. A population of 141 patients was obtained from medical record data at Rumah Sehat Untuk Jakarta Cengkareng Hospital. To determine the number of samples using the Slovin formula with an error tolerance limit level of 5%.

$$n = \frac{141}{1+(141.0{,}05^2)} = 104{,}4 \sim 105$$

Description:
n = number of samples
N = total population
e = error tolerance limit (5% = 0.05)

The sample obtained from the population is 105 samples, and the sample data will be taken using the random sampling method.

3. RESULTS

The characteristics of patients with Type 2 DM according to the inclusion criteria can be seen in Table 1.

Table 1. Characteristics of Patients.

Characteristics	(n = 105)	%
Sex		
Male	49	46.7
Female	56	53.3
Ages (years)		
<35	2	1.9
36-45	10	9.5
46-55	33	31.4
56-65	38	36.2
>65	22	21
Length of stay (day)		
3-6	42	40
7-11	47	44.8
12-16	14	13.3
17-22	2	1.9
Social status		
Marry	70	66.7
Single	21	20
No data	14	13.3
Employment status		
Working	34	32.4
Not employed	27	25.7
Housewife	44	41.9
Payment		
BPJS	104	99.05
Non BPJS	1	0.95

Table 2 below shows patterns of antidiabetic drug prescribing in Type 2 DM patients. The results show that there were single drugs, two combinations, and three combinations; the use of different amounts of drugs depends on the patient's clinical condition and blood glucose levels during treatment.

Table 2. Pattern of Antidiabetic Prescribing (n = 105)

No	Route of administration	Drug use	Classification of antidiabetic drugs	Drugs	n (n = 105)	%
1	Oral (n= 17)	Single	Biguanid	Metformin 500mg	6	5,71
			Sulfonilurea	Gliquidon 30mg	3	2,86
				Glimepiride 2mg	2	1,90
			Dipeptidyl Peptidase-4 Enzyme Inhibit	Silatgliptin 100mg	4	3,81
		Combination	Dipeptidyl Peptidase-4 Enzyme Inhibit + Biguanid	Silatgliptin 100mg + Metformin 500mg	1	0,95
			Dipeptidyl Peptidase-4 Enzyme Inhibit + Sulfonylurea	Silatgliptin 100mg + glimepiride 1mg	1	0,95
2	Parenteral (n= 50)	Single	Rapid-acting insulin	Aspart	18	17,14
				Gluisine	4	3,81
			Insulin Premixed	Aspart + degludec	9	8,57

No	Route of administration	Drug use	Classification of antidiabetic drugs	Drugs	n (n = 105)	%
			Long-acting insulin	Glargine	1	0,95
				Determir	1	0,95
	Parenteral	Combination	Fast-acting + long-acting insulin	Aspart + glargine	15	14,29
				Gluisine + glargine	2	1,90
3	Oral and parenteral (n= 38)	Antidiabetic oral drugs + Parenteral	Insulin + biguanid	Aspart + degludec + Metformin 500mg	6	5,71
				Aspart + Metformin 500mg	8	7,62
			Insulin + Sulfonilurea	Aspart + degludec+ Gliquidon 30mg	4	3,81
				Aspart + Glimepirid 2mg	3	2,86
				Aspart + Gliquidon 30mg	3	2,86
				Gluisine + Glimepirid 2mg	2	1,90
				Gluisine + Glargine + Glimepirid 2mg	1	0,95
			Insulin + Dipeptidyl Peptidase-4 Enzyme Inhibit	Aspart +degludec + Sitagliptin 100mg	5	4,76
			Insulin + biguanid + sulfonilurea	Aspart + Metformin 500mg + Glimepirid 4mg	5	4,76
			Insulin + Tiazolidinedion + Alpha Glucosidase inhibitors	Aspart + degludec + Pioglitazone 30mg + Acarbose 100mg	1	0,95

The appropriateness of the treatment given to the patients compared to the PERKENI 2021 for DM treatment guidelines. The total number of drugs used by the patients was 172 out of 105. This is due to differences in the amount of treatment received by the patients. Table 2 summarises the appropriateness of the prescriptions received by the patients during treatment in the figure below.

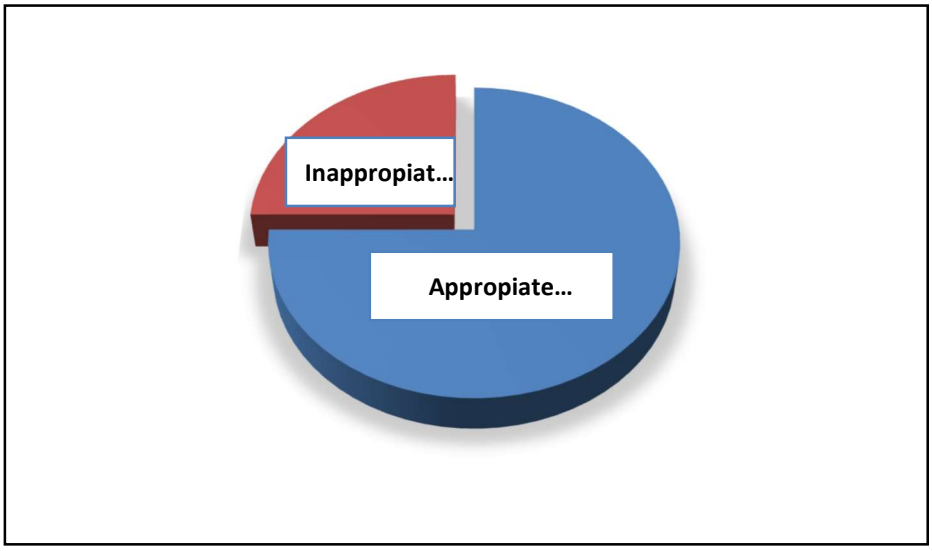

Figure 1. Appropriateness of antidiabetic drug use.

4. DISCUSSION

Based on Table 1 above, it can be seen that the characteristics of the sample based on gender were women, 56 patients with a percentage of 53%. This result is in accordance with the previous research, which states that women suffer more from Type 2 DM than men [6]. The thing that underlies these results is that it can be due to a lack of exercise and physical activity. Another reason that strengthens the more frequent occurrence of Type 2 DM in women is due to differences in sexual hormone levels and body composition between women and men. The decrease in the concentration of estrogen hormone in menopausal women causes an increase in fat reserves in the body, especially in the abdomen; this condition causes insulin resistance, which is a risk factor for Type 2 DM. Gender differences in glucose homeostasis, but the mechanism is not yet well known [6].

Based on age in the study, the highest number of patients was in the age range of 56-65 years, and the average was 57.2 years. This result is in accordance with the previous research, which states that 55-64 years of age is the largest group experiencing Type 2 DM. This age group it is referred to as the clinical stage because there is a decrease in function in the body's systems, including, among others, the immune, sexual and reproductive systems, endocrine, cardiovascular, gastrointestinal, muscles and nerves, and tend to have a less active lifestyle and an unbalanced diet. The aging process is accompanied by reduced beta cell function and insulin resistance, which are risk factors for cardiovascular disease. As well as partial changes such as decreased insulin secretion and inadequate insulin levels against hyperglycemia, insulin resistance also affects glucose uptake as well as the sensitivity of beta cells [7].

Length of stay is the number of days the patient is hospitalized, which is obtained from the calculation of the date of discharge-date of admission based on the disease index at Healthy Home for Jakarta Regional Public Hospital Cengkareng. In the hospital, the standard length of treatment for DM patients depends on the severity. So that if the length of treatment exceeds the predetermined standard, there is a possibility of being accompanied by a complicating disease. Therefore, the length of treatment for patients varies and is very dependent on the patient's condition, especially if there are complications experienced by the patient during treatment [8].

Based on the social status of patients, 67% were married. The results of this study are in accordance with the previous research research of Sari Mulia and Noor Diani (2019), which states that married is the most common marital status in patients with Type 2 DM. The results of this study found that the majority of respondents who had a partner or were married had a better quality of life than respondents with divorced marital status. Social status itself is not one of the risk factors directly related to diabetes mellitus. However, this is because married respondents get support from their husbands, who are life partners. The results of this

study are in accordance with empirical research conducted in Iran which shows that married individuals have a higher quality of life score compared to individuals who are not married or widowed or widowers [9].

Based on the employment status of patients, the highest proportion was housekeeping, with 42%. The results of this study are in accordance with the previous research, which states that taking care of the household is the most common occupation in patients with Type 2 DM. The type of work is also closely related to the occurrence of diabetes mellitus. A person's occupation will affect their daily physical activity level because physical activity can control blood sugar in line with research showing that in Indonesia, most of the patients with the risk of developing diabetes mellitus are in jobs with the status of taking care of the household [9].

Based on Table 1 above, it can be seen that the characteristics of the sample based on health insurance in DM patients are mostly with BPJS (Social Security Agency) 104 (99.05%). These results are because Healthy Home for Jakarta Regional Public Hospital Cengkareng is a regional public hospital that stands under the DKI Jakarta Government, which is obliged to provide services to participants of the National Health Insurance (JKN) with BPJS Fee from the government [10].

Based on Table 2 above, it can be seen that the prescription pattern for Type 2 DM patients at Healthy Home for Jakarta Regional Public Hospital Cengkareng based on the route of administration, the highest number of uses is in the route of administration by parenteral method, namely fast-acting insulin drugs, Insulin Aspart as many as 18 (17.14%) patients. The use of insulin is given if the condition of DM patients has dropped or has very high blood glucose levels. Type 2 DM patients who have poor blood glucose control with the use of oral antidiabetic drugs need to be considered for the addition of insulin as a combination therapy with oral drugs or single insulin. Insulin given earlier and better is mainly related to the problem of glucogenesis. It is shown by the improvement of pancreatic beta-cell function that insulin has other beneficial effects in relation to DM complications. The widespread use of novorapid injection is because it is rapid acting and has advantages in terms of injection. Insulin aspart can be injected 15 minutes before meals. In addition, rapid-acting insulin can provide a faster postprandial glucose-lowering effect than regular insulin [10].

According to the 2020 ADA recommendations, the biguanide class is the preferred initial pharmacological agent for the treatment of Type 2 DM. Once initiated, the biguanide class should be continued as long as tolerated and not contraindicated. Other agents, including insulin, should be added to the biguanide class. Biguanide should be started at the time Type 2 DM is diagnosed unless contraindicated; for many patients, this will be monotherapy in combination with lifestyle modifications [11].

The most widely used combination of several oral antidiabetic drugs is the combination of insulin with biguanine in as many as 14 (13.33%) patients. The mechanism of action of sulfonylurea is by stimulating insulin secretion, and the Biguanid group also works to reduce hepatic gluconeogenesis, increase insulin sensitivity, and reduce glucose absorption in the gastrointestinal tract. Based on the mechanism of action, the combination of these drugs can reduce blood glucose faster than the single treatment of each drug. The use of a combination with sulfonylurea can be recommended from the beginning of diabetes management, based on the results of the UKPDS (United Kingdom Prospective Diabetes Study) study of Type 2 DM patients who can then be controlled with a single treatment of sulfonylurea to the maximum dose. For the combination of OHO and insulin, which is widely used which is given at night before bedtime. With this therapeutic approach, good blood glucose control can generally be obtained with a fairly small dose of insulin [10].

As many as patient 26, many of the antidiabetic drugs used were fast-acting insulin-class drugs. Rapid-acting insulin can be given if the blood glucose is >200 mg/dl, while the patient's current blood glucose is 427 mg/dl and after being given rapid-acting insulin, has a decrease in blood glucose of 231 mg/dl. The use of fast-acting insulin should be used after checking the current blood glucose value because fast-acting insulin can reduce blood glucose levels very quickly and can cause hypoglycemia, which is very dangerous for patients with Type 2 DM.

Based on Figure I above, it can be seen that the suitability of using antidiabetic drugs is carried out by comparing with PERKENI in 2021. The suitability of prescribing is said to be appropriate if type 2 diabetes mellitus patients with HbA1c when examined <7.5%, then treatment begins with healthy lifestyle modification and oral monotherapy. Patients with HbA1c values> 7.5 have received oral therapy and do not reach the Hba1c target <7.5%, then they are given combination therapy, and if the HbA1c value is> 9%, a combination of insulin therapy is given [12].

In this study, 79 patients, 75%, were right to give antidiabetic drug therapy, and 26 patients, 25%, were not right to use antidiabetic drugs. The inaccuracy of use is due to the selection of the use of Antidiabetic Drugs at a healthy home for Jakarta Regional Public Hospital Cengkareng, which refers to the literature that uses the value of timed blood glucose for treatment reference.

5. CONCLUSION

The pattern of prescribing antidiabetic drugs at healthy home for Jakarta regional public hospital Cengkareng based on the route of administration that is widely used is the parenteral route of administration as many as 50 (48%) patients with fast-acting insulin 18 (17%) patients, insulin aspart 18 (17%) patients. The suitability of prescribing antidiabetic drugs based on PERKENI in 2021 is 79 (75%) patients and patients with inappropriate use of drugs as many as 26 (25%) patients.

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