

Article

Evaluation of the Use of Anti-Diabetic Drugs in Outpatient Type II Diabetes Mellitus Patients at Lasinrang Regional General Hospital, Pinrang Regency in 2023

Rizqi Nur Azizah, Alfina Damayanti, Dewi Yuliana*

Faculty of Pharmacy, Universitas Muslim Indonesia, Makassar, 90231 South Sulawesi, Indonesia

* Correspondence: dewi.yuliana@umi.ac.id

Citation: Azizah, R.N.; Damayanti, A.; Yuliana, D.
Evaluation of the use of anti-diabetic drugs in
outpatient type II diabetes mellitus patients at
Lasinrang Regional General Hospital, Pinrang Re-
gency in 2023. *J Pharm Nat Sci* 2024, *1*(3), 94-101.
<https://doi.org/10.70392/jpns.v1i3.94101>

Academic Editor: Dr. Islamudin Ahmad

Received: 9 Agustus 2024

Revised: 30 November 2024

Accepted: 30 November 2024

Publisher's Note: B-CRETA publisher stays neutral
with regard to jurisdictional claims in published
maps and institutional affiliations.



Copyright: © 2024 by the authors. Submitted for
possible open access publication under the terms
and conditions of the Creative Commons Attribu-
tion-NonCommercial-ShareAlike (CC-BY-NC-SA)
4.0 International License (<https://creativecommons.org/licenses/by-nc-sa/4.0/>).

ISSN: 3047-5457

Abstract

Diabetes Mellitus (DM), including a disease in the form of metabolic disorders characterized by impaired insulin secretion, impaired insulin production and insulin sensitivity, causing an increase in blood sugar levels (hyperglycemia). This study aims to determine the use of antidiabetic drugs which include the right drug, the right dose, the right indication and the right frequency of administration in outpatient type II diabetes mellitus patients at Lasinrang Regional General Hospital, Pinrang District in 2023. This study is a non-experimental research with a descriptive design retrospectively. The sample in this study is all outpatients with a diagnosis of type II diabetes mellitus at the Lasinrang Regional General Hospital, Pinrang District in 2023. The sampling technique used is purposive sampling. The sample of this study is medical record data of patients with type II diabetes mellitus in 2023, which is adjusted to the inclusion criteria. The results of the study showed that of 87 samples consisting of 55 women and 32 men, all of which met the inclusion and exclusion criteria, and showed that the prevalence of age was more susceptible to be affected at the age of 46-55 years as many as 40 patients (45.98%). In the analysis of the accuracy of drug use, outpatient type II diabetes mellitus patients at the Lasinrang Regional General Hospital, Pinrang regency in 2023 have an indication accuracy of 100%, 100% drug accuracy, 100% dose accuracy, and 100% on-time administration.

Keywords: Diabetes mellitus, outpatient, accuracy assessment

1. INTRODUCTION

Diabetes Mellitus (DM), including a disease in the form of a metabolic disorder characterized by impaired insulin secretion, impaired insulin production, and insulin sensitivity causing an increase in blood sugar levels (hyperglycemia) [1]. Diabetes mellitus (DM) itself is often known as a disease that can kill silently, because this disease is often not known or realized by the sufferer, and when it is known it has become a complication [2].

According to PERKENI (2021) [3], complications caused by diabetes mellitus are disorders of the vascular area, both macro and microvascular, and also occur in disorders of the nervous system or neuropathy, where macrovascular disorders often affect the heart, blood vessels, and brain. Meanwhile, microvascular disorders often affect the eyes and kidneys [3]. This condition is classified as a chronic disease because it lasts for years. The risk factors are age, obesity, genetics, gender, hypertension, food, alcohol, smoking, inactivity, and abdominal circumference [4].

According to the World Health Organization survey, Indonesia has the fourth highest number of diabetics in the world after India, followed by China, and the United States (USA). In 2000, there were around 8.4 million people with diabetes and it is estimated that around 21.30 million people will be affected in 2030. Diabetes worldwide accounts for about 60.0% mortality and 43.0% morbidity [5]. The International Diabetes Federation (IDF) organization has predicted that the number of DM patients will increase from 10.30 million over the last 4 years (2013-2017) to 16.70 million by 2045. The high mortality rate due to DM disease and reaching 58% makes diabetes a group of chronic diseases identified as an important health problem in the world. WHO estimates that there will be 30 million people with DM in Southeast Asia in 2000, and this number could increase to 80 million by 2025 [6].

According to the RISKESDAS report on the prevalence of diabetes mellitus based on a doctor's diagnosis in the population of all ages in South Sulawesi Province is 1.3% with a total population of 50,127 people and for Pinrang district with a percentage (1.02%) with a total population of 2,142 people. Patients with type II diabetes mellitus at Lasinrang Regional General Hospital, Pinrang Regency have increased in the last 3 years, it was recorded that in 2019 there were 357 cases (2.25%) of the total number of diseases, namely 15,863 cases, in 2020 there were 584 cases (5.10%) of the total number of diseases, namely 11,441 cases and in 2021 there were 558 cases (5.15%) of the total number of diseases, namely 10,845 cases. The increase in diabetes cases over a period of time can affect the incidence of complications that will be experienced by sufferers and can affect the quality of life of diabetes mellitus patients. [4]

The use of DM drugs can use a selection of sulfonylurea group drugs, biguanid groups, glinid groups, thiazolidinedione groups, DPP-4 inhibitor groups, SGLT-2 inhibitor groups, and α -glucosidase inhibitor groups. These groups can be used as monotherapy or combination therapy, in controlling blood glucose levels [7]. DM management has the ultimate goal, to keep plasma glucose levels in the normal range, and prevent the possibility of acute complications [3].

Evaluation of Drug Use (EPO) is a way that can be used to see the accuracy in using drugs which is carried out on an ongoing basis to ensure suitability in the use of drugs [8,9]. Rationality of treatment is expected to be able to help patients achieve the expected therapeutic targets [10,11]. Irrationality in drug use can have an economic impact where there is an increase in medical costs [10]. When many options are available for the same purpose, cost-effectiveness analysis can be used to determine which program or treatment is most appropriate [12].

2. METHODS

This study was conducted at Lasinrang Regional General Hospital, Pinrang Regency, South Sulawesi and has received approval from the ethics committee (Number: 191/A.1/KEPK-UMI/V/2024). The population used in the study were all outpatients with a diagnosis of type 2 diabetes mellitus at Lasinrang General Hospital, Pinrang district in 2023.

The sampling technique used was purposive sampling. The number of samples obtained from calculations using the slovin formula is 87 samples. The inclusion criteria: outpatient data diagnosed with type 2 diabetes mellitus in 2023, outpatient data for type 2 diabetes mellitus with age > 26 years, outpatient data for type 2 diabetes mellitus who only get oral antidiabetic therapy, and outpatient data for type 2 diabetes mellitus with complete medical record data. Exclusion criteria in this study were data on outpatients with type 2 diabetes mellitus who were pregnant.

3. RESULT AND DISCUSSION

This study used medical record data of patients with type 2 diabetes mellitus outpatient at Lasinrang Regional General Hospital, Pinrang Regency in 2023, there were 87 medical record samples.

3.1 Patient Characteristics Based on Gender

From these data (Table 1), it was found that the characteristics of outpatients affected by type II diabetes mellitus at Lasinrang Regional General Hospital, Pinrang Regency in 2023, based on gender, namely men 32 patients (36.78%) and women consisting of 55 patients (63.22%). This is similar to research conducted by Wima Anggitasari et al (2024) [13] which states that, patient characteristics based on gender are dominated by women. This shows that women are more likely to develop type 2 diabetes mellitus because physically women have a considerable opportunity to increase body mass index, the risk of obesity so that it can interfere with insulin sensitivity which is influenced by the hormone estrogen during premenstrual syndrome, then in post-menopause will make the distribution of fat in the body easier to accumulate. Meanwhile, men also have a range of diabetes mellitus because men have the hormone testosterone, which if the level of testosterone hormone exceeds the limit, it will cause an increase in abdominal fat accumulation, which will cause obesity [14].

Table 1. Patient Characteristics Based on Gender

No	Gender	Sum	Percentage (%)
1.	Male	32	36.78
2.	Women	55	63.22
Sum		87	100

3.2 Patient Characteristics Based on Age

From the data based on age (Table 2), patients were grouped into five categories, namely the elderly category (> 65 years) as many as 15 patients (17.24%), late elderly (56 - 65 years) as many as 20 patients (22.99%), early elderly (46 - 55 years) as many as 40 patients (45.98%), late adults (36 - 45 years) as many as 7 patients (8.05%), early adults (26 - 35 years) as many as 5 patients (5.75%). Based on age characteristics, patients are more dominated by the age group 46 - 55 years.

Table 2. Patient Characteristics Based on Age

No	Age	Sum	Percentage (%)
1	26 – 35 years old	5	5.75
2	36 – 45 years old	7	8.05
3	46 – 55 years old	40	45.98
4	56 - 65 years old	20	22.99
5	> 65 years old	15	17.24
Sum		87	100

This is commensurate with research conducted by Dwi Aulia et al (2020) [15], namely seen from the age range of patients suffering from type 2 diabetes mellitus as much as 81% experienced by the early-late elderly (46-65 years), 9% experienced by seniors > 65 years, and 10% in late adulthood 35-45 years. The data obtained is in accordance with the statement from the American Diabetes Association (ADA) [16] stating that age over 45 years is one of the risk factors for type II diabetes mellitus. People who have an age of more than 45 years with a low glucose diet setting will experience shrinkage of pancreatic beta cells. The remaining pancreatic beta cells are generally still active, but their insulin secretion is reduced. Ageing is a high-risk factor for type II DM, which is associated with decreased pancreatic cell function, insulin secretion, and insulin resistance due to reduced muscle mass and vascular changes. Lack of physical activity can also make a person prone to overweight and even obesity.

According to the PERKENI 2021 [3] Diabetes Mellitus treatment algorithm, diabetes mellitus treatment begins with healthy lifestyle modifications first, or using a drug of choice, namely a single therapy of oral antidiabetic drugs, then if a single therapy of oral antidiabetic drugs cannot control blood sugar levels in the body, then a combination therapy of antidiabetic drugs with different modes of action or different classes of antidiabetic drugs can be used.

3.3 Type of oral antidiabetic drug used

From these data (Table 3), it was found that the most widely used oral antidiabetic drugs in single therapy were biguanid group, namely metformin as much as 20 (22.99%) followed by glimepirid single therapy as much as 15 (17.24%) and glibenclamide as much as 5 (5.75%). Whereas in combination therapy, the most widely used oral antidiabetic drug was metformin + glimepiride as much as 40 (45.98%), followed by a combination therapy of metformin + glibenclamide as much as 7 (8.05%).

Table 3. Type of oral antidiabetic drug used

No	Class of Drug	Type of Drug	Sum	Percentage (%)
1	Biguanid	Metformin	20	22.99
2	Sulfonylurea	Glimepiride	15	17.24
		Glibenklamide	5	5.75
3	Drug group combination	Metformin+Glimepiride	40	45.98
		Metformin+Glibenklamide	7	8.05
Sum			87	100

According to the PERKENI 2021 [3] Diabetes Mellitus treatment algorithm, diabetes mellitus treatment begins with healthy lifestyle modifications first, or using a drug of choice, namely a single therapy of oral antidiabetic drugs, then if a single therapy of oral antidiabetic drugs cannot control blood sugar levels in the body, then a combination therapy of antidiabetic drugs with different modes of action or different classes of antidiabetic drugs can be used.

The results of this study are in line with Putri Ayu Sari et al (2023) [17] which shows that the most widely used single therapy drug is metformin which is used as the first choice for single therapy treatment (monotherapy) or combination therapy for patients with diabetes mellitus. Metformin is recommended as initial pharmacological therapy in the absence of specific contraindications, due to its direct effect on glycemia. Metformin decreases glucose production in the liver and increases the sensitivity of muscle and adipose tissue to insulin. If with lifestyle interventions and the maximum tolerated dose of metformin the glycemia target is not achieved or cannot be maintained, other drugs should be added after 2-3 months of starting treatment or at any time if the A1C target is not achieved [19].

The most commonly used drug class for patients with diabetes mellitus after the biguanid group is the sulfonylurea group. The use of sulfonylurea class drugs is quite high because the use of sulfonylurea class drugs is the drug of choice for the treatment of new patients for adults diagnosed with diabetes mellitus with normal body weight or less and this class of drugs generally has side effects that are quite mild and low in frequency. Sulfonylurea drugs have a mechanism of action that can stimulate or increase insulin secretion by pancreatic beta cells. Side effects that may occur include gastrointestinal disorders, such as nausea, diarrhea and abdominal pain [18].

Combination therapy of 2 kinds of drugs can be given to patients if within 3 months after using a single oral antidiabetic therapy blood sugar levels do not get better. Combination therapy can be given to patients with HbA1c values $\geq 7.5\%$ when examined [3]. The combination of metformin and glimepirid is the most commonly used combination in diabetes mellitus therapy, because the combination can reduce HbA1c greater, namely as much as 0.8-1.5% compared to using only metformin or glimepirid alone. In addition, this combination can also minimize the occurrence of hypoglycemia in patients [19]. Sulfonylurea and biguanid drugs have a mechanism of action that binds to each other and has a synergistic effect on insulin receptor sensitivity, where the sulfonylurea group will start by stimulating insulin secretion by pancreatic beta cells [18].

3.4 Correct Medication

Based on the data above, it can be seen that the evaluation of the assessment in the determination of the use of antidiabetic drugs in outpatient diabetes mellitus patients at one of the hospitals in Pinrang district obtained the right percentage of drugs by 100% with a total of 87 patients.

Table 4. Correct Medication

Information	Sum	Percentage (%)
Correct	87	100
Not Correct	0	0
Sum	87	100

This is in line with research conducted by Arief Nur Hidayat et al (2023) [20] which showed that the accuracy of the drug reached 100%. Appropriate medicine is the decision to make therapeutic efforts taken after the diagnosis is correctly established. Thus the drug chosen must have a therapeutic effect in accordance with the spectrum of the disease [16]. Based on the correct diagnosis, the right drug selection must be made. Proper drug selection can be seen from the accuracy of the therapeutic class and type of drug that is in accordance with the diagnosis.

3.5 Correct Dosage

Based on the data above, it can be seen that the evaluation of the assessment in the determination of the dose of the use of antidiabetic drugs in outpatient diabetes mellitus patients at one of the hospitals in Pinrang district obtained the percentage of the right dose of 100% with a total of 87 patients.

Table 5. Correct Dosage

Information	Sum	Percentage (%)
Correct	87	100
Not correct	0	0
Sum	87	100

This is in line with research conducted by Putri Ayu Sari et al (2023) [17] which showed that the accuracy of the drug reached 100%. The right dose is the suitability of administering drug therapy in accordance with the therapeutic range of the drug and with the patient's condition [18]. The use of doses that are too low can produce unwanted responses and drug concentrations in the plasma of patients who are below the desired therapeutic range or range and even become one of the causes of ineffectiveness of drug therapy [19].

3.6 Appropriate Indication

Based on the data above, it can be seen that the evaluation of appropriate indications in outpatient diabetes mellitus patients at one of the hospitals in Pinrang Regency meets the criteria for accuracy of indications with a total of 87 patients with the percentage results obtained of 100%.

Table 6. Appropriate Indication

Information	Sum	Percentage (%)
Correct	87	100
Not Correct	0	0
Sum	87	100

The results of this study are consistent with Wima Anggitasari et al (2024) [13] who show that based on data from the medical records of all patients (100%), the correct indication is that the appropriateness of the use of related drugs is correct if the patient receives the drug based on the diagnosis received by the patient. These drugs are drugs indicated as DM therapy such as metformin, glimepirid and glibenclamide either used alone or in combination [20].

3.7 Appropriate Frequency of Administration

Based on the data above, it can be seen that the evaluation of appropriate indications in outpatient diabetes mellitus patients in one of the hospitals in Pinrang district meets the criteria for the accuracy of the frequency of administration with a total of 87 patients with the percentage results obtained of 100%.

Table 7. Appropriate Frequency of Administration

Information	Sum	Percentage (%)
Correct	87	100
Not Correct	0	0
Sum	87	100

The results of this study are in line with Putri Ayu Sari et al (2023) [17] the timeliness of the first administration of antidiabetic drugs with the administration of the second and subsequent drugs. The accuracy of the interval can be known from the patient's obedience in taking the given drug. Metformin from the biguanid group can be given 1-3 times a day because it has a duration of action ranging from 6-8 hours. Then glibenclamide and glimepirid drugs from the sulfonylurea drug group can be given 1-3 times a day because they have a long duration of action of 6-8 hours [21].

4. CONCLUSION

1. Characteristics of patients based on gender are more suffered by female patients as many as 55 patients (63.22%) and males as many as 32 patients (36.78%) and characteristics based on age are more suffered at the age of 46 - 55 years as many as 40 patients (45.98%) and the lowest suffered at the age of 26 - 35 years as many as 5 patients (5.75%).
2. Evaluation of the use of antidiabetic drugs in outpatient type II diabetes mellitus patients at Lasinrang Regional General Hospital, Pinrang Regency in 2023 obtained 100% drug accuracy, 100% dose accuracy, 100% indication accuracy and 100% frequency of drug administration accuracy.

REFERENCES

1. Husen, F., Hernayanti, H., Ekowati, N., Sukmawati, D., Ratnaningtyas, N.I. Antidiabetic effects and antioxidant properties of slack ink cap medicinal mushroom, *Coprinus comatus* (Agaricomycetes) in streptozotocin-induced hyperglycemic rats. *International Journal of Medicinal Fungi* 2021, 23(10), 9-21.
2. Ministry of Health, R.I. Indonesia's health profile. Jakarta: Ministry of Health, Republic of Indonesia, 2014.
3. PERKENI. Pedoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Dewasa di Indonesia 2021. Pb Perkeni. 2021, 1-46.
4. Basic Health Research (Riskesdas). Ministry of Health Research and Development Agency of the Republic of Indonesia. 2018
5. WHO. Global Report on Diabetes. [Internet]. 2024 [cited 2024 November 27] Available from: <https://www.who.int/publications/i/item/9789241565257>
6. American Diabetes Association. Pharmacologic approaches to glycemic treatment: Standards of medical care in diabetes 2021. *Diabetes Care* 2021, (44) 111-124.
7. Anggraini, D., Hidayat, W. Correlation of Blood Sugar Levels with the Angkel Bracial Index (Abi) Value of Diabetes Mellitus Patients in the Inpatient Room of Ibnu Sina Bukittinggi Islamic Hospital in 2013. *Afiyah* 2014, 1(1), 1-8.
8. Jia, Y., Lao, Y., Leung, S. Glycemic Control Efficacy of Oral Antidiabetic Drugs in Treating Type 2 Diabetes: protocol for network meta-analysis. *BMJ Open* 2015, 4(11), 1-4.
9. Kardela, W., Abdillah, R., Handicka, G. Rationality of Drug Use for Diabetes Mellitus Type 2 Complications of Nephropathy at Central General Hospital Dr. M. Djamil Padang. *Higea Pharmacy Journal* 2019, 11(2), 195-200.
10. Sihombing, A.G.G. Rationality of diabetes mellitus type II treatment. *Journal of Medika Hutama* 2022, 3(2), 2175-2179.
11. Ramdini, D.A., Wahidah, L.K., Atika, D. Evaluation of the rationality of the use of type II diabetes mellitus drugs in outpatients at Pasir Sakti Health Center in 2019, *Jurnal Farmasi Lampung* 2020, 9(1), 69-76.
12. Yuliana, D., Widowati, F.D., Fawwaz, M. Pharmacoeconomic analysis of chemotherapy regimen of breast cancer patients at Hasanuddin University Hospital, Makassar. *Pharmaceutical Media* 2024, 20(1), 71-83.
13. Anggitasari, W., Pebriarti, I.W., Mayasari, S. Evaluation of the Rationality of Type 2 Diabetes Mellitus Treatment in Outpatients at One of the Jember Regency Hospitals. *PHARMACON* 2024, 13(1), 378-383.
14. Kurniawati, T., Lestari, D., Rahayu, A.P., Syaputri, F.N., Tugon, T.D.A. Evaluation of the profile of antidiabetic drug use among outpatients with type 2 diabetes mellitus in one of the hospitals in Bogor Regency. *Journal of Science, Technology and Entrepreneurship* 2021, 3(1), 1-4.
15. American Diabetes Association, Standards of Medical Care in Diabetes. USA: Diabetes Care, 2016.
16. Sari, P.A., Primadhamanti, A., Angin, M.P. Evaluation of the rationality of the use of antidiabetic drugs in patients with type 2 diabetes mellitus with hypertension complications at Pertamina Bintang Amin Hospital, Bandar Lampung. *Journal of Medika Malahayati* 2023, 7(1), 498.

17. Azizah, R. N., Hudayah, A. Identification of drug use in elderly type II diabetes mellitus patients with Beer's Criteria in the Inpatient installation of Ibnu Sina Hospital Makassar Period 2012. *As-Syifaa Pharmacy Journal* 2016, 8(1), 82-94.
18. Rojas, L.B.A. Gomes, M.B. Metformin: An old but still the best treatment for type 2 diabetes. *Diabetology and Metabolic Syndrome* 2013, 5, 1-5.
19. Hidayat, A. N., & Siwi, K. Evaluation of rationality of oral antidiabetes medications on the effectiveness of therapy for diabetes melites tip ii patients at dr. moewardi surakarta Hospital. *Jambura Journal of Health Sciences and Health Research* 2023, 5(3), 815-824.
20. Ministry of Health, R. I. Module on Rational Use of Medicines. *Pharmaceutical Services Development*, Jakarta 2011.