

Effectiveness of Antidiabetic Drugs on Reducing Blood Glucose Levels in Type 2 Diabetes Mellitus Patients at RSI Sunan Kudus 2025

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Abstract. Effectiveness of antidiabetics in routine clinical practice may differ from outcomes reported in randomized clinical trials. Treatment effectiveness is influenced by multiple factors, including patient characteristics, medication adherence, comorbidities, disease severity, and prescribing patterns within healthcare institutions. This study was to determine the effectiveness of antidiabetic drug use in reducing blood sugar levels in patients with type 2 diabetes mellitus at Sunan Kudus Islamic Hospital in 2025. This study employed a quantitative descriptive design using a retrospective cross-sectional approach. Data were collected from the medical records of hospitalized patients with type 2 diabetes mellitus at Sunan Kudus Islamic Hospital between May and June 2026. The study population consisted of 1,767 patients treated during 2025. Following the application of the inclusion and exclusion criteria, 130 eligible patients were selected using purposive sampling. Data analysis was performed using descriptive statistical methods. The collected data were processed in Microsoft Excel, and the results were summarized and presented as frequencies and percentages. Characteristics based on age dominated by 56-65 years as many as 55 patients (42.3%), gender of most patients were female namely 76 patients (58.4%), body weight was mostly in the range of 51-60 kg as many as 72 patients (55.4%), comorbidities diseases of the most patients were patients with hypertension as many as 26 patients (20%). A combination of 2 drugs was the most popular choice for DM drug therapy used by 87 patients (66.9%). The effectiveness of antidiabetic drug use of Acarbose 50 mg (51.8%); then therapy using a combination of 2 drugs showed a combination of Glimepiride 2 mg and Sansulin of 58.1%, and a combination of 3 drugs, a combination of Acarbose 100 mg, Glimepiride 2 mg, and Metformin 62.6%. Antidiabetic drugs are effective in lowering blood glucose levels in patients with type 2 diabetes mellitus at Sunan Kudus Islamic Hospital in 2025.

Keywords: Antidiabetic, Blood Glucose Level

INTRODUCTION

Diabetes mellitus is a group of metabolic disorders characterized by abnormalities in insulin secretion, insulin function, or a combination of both (Perkeni, 2021). Indonesia ranks fifth globally in the number of people living with type 2 diabetes mellitus (T2DM) (IDF, 2021). The prevalence of diabetes mellitus in Central Java Province, among residents of all ages, was recorded at 1.8%. Diabetes mellitus cases in Central Java remained fluctuating from 2020 to 2022 (Dinkes Jateng, 2022)

Evidence-based clinical guidelines provide recommendations for antidiabetic therapy; the effectiveness of these medications in routine clinical practice may differ from outcomes reported in randomized clinical trials. Treatment effectiveness is influenced by multiple factors, including patient characteristics, medication adherence, comorbidities, disease severity, and prescribing patterns within healthcare institutions (Davies *et al.*, 2022).

Metformin is recommended as the first-line antidiabetic therapy, either as monotherapy or in combination, and has been shown to be highly effective in reducing blood glucose levels and preventing diabetes-related complications (Dipiro *et al.*, 2023). Metformin's effectiveness in lowering glycemic levels is considered very good, with a potential HbA1c reduction of 1.0 to 2.0%. It also has the advantages of a low risk of hypoglycemia and more affordable treatment costs. In addition to being used as a monotherapy, metformin is also used in combination therapy with gliclazide in 22.89% of patients to achieve more optimal blood glucose control (Artini *et al.*, 2023).

The number of T2DM cases at Sunan Kudus Islamic Hospital (RSI Sunan Kudus) in 2025 was considerably high, with 1,767 inpatient cases and 5,642 outpatient cases. However, no previous study has evaluated the effectiveness of antidiabetic therapy in this hospital. Therefore, evaluating the real effectiveness of antidiabetic therapy is essential to determine whether current treatment strategies successfully achieve glycemic control.

METHODS

This study employed a quantitative descriptive design using a retrospective cross-sectional approach. Data were collected from the medical records of hospitalized patients with type 2 diabetes mellitus at Sunan Kudus Islamic Hospital between May and June 2026. The study population consisted of 1,767 patients treated during 2025. Following the application of the inclusion and exclusion criteria, 130 eligible patients were selected using purposive sampling. **Data Analysis:** Data analysis was performed using descriptive statistical methods. The collected data were processed in Microsoft Excel, and the results were summarized and presented as frequencies and percentages

RESULTS AND DISCUSSION

Characteristics of type 2 DM patients hospitalized at RSI Sunan Kudus in 2025 based on age can be seen in Table 1.

Table 1. Characteristic

Characteristic	Frequency (n)	Percentage (%)
Ages (Year)		
36-45	9	6,9
46-55	32	24,6
56-65	55	42,3
>65	34	26,2
Gender		
Man	54	41,6
Woman	76	58,4
Body Weight (kg)		
41-50	3	2,3
51-60	72	55,4
61-70	44	33,8
>70	11	8,5

Based on Table 1, it can be seen that the majority of type 2 diabetes patients in the inpatient ward of Sunan Kudus Islamic Hospital (RSI) during 2025 were in the 56-65 age group (55 patients, 42.3%), while the lowest number of diabetes sufferers was in the 36-45 age group (9 patients, 6.9%). This is because, in this study, the aging process in patients plays a significant role in increasing the risk of developing type 2 diabetes. As age increases, physiological changes occur that affect glucose metabolism in the body.

This is in line with research conducted by Abdelrazig (2021), whose results showed that quality of life status was related to age (41.67%). Regarding type 2 diabetes patients, physiological, anatomical, and biochemical changes that occur with age will increase glucose disorders and insulin resistance. Impaired glucose tolerance increases with age.

The gender of type 2 diabetes patients in the inpatient ward of Sunan Kudus Islamic Hospital in this study was predominantly female (76 patients) (58.4%), while only 54 patients (41.6%) were male. This is because women in this study are influenced by biological, hormonal, and metabolic factors. This is in line with research conducted by Li *et al.* (2021), which stated that the prevalence of type 2 diabetes mellitus is higher in women (74%) compared to men, due to decreased estrogen levels, which can lead to fat accumulation and thus increase insulin resistance.

Most of the type 2 diabetes patients in this study weighed between 51 and 60 kg, amounting to 72

patients (55.4%). This is because the majority of type 2 diabetes patients in this study weighed 51–60 kg. This weight range is common in the Indonesian adult population. This range can be categorized as overweight or even obese, which are important risk factors for type 2 diabetes.

These results align with research by Abdelrazig (2021), which showed a significant association between Body Mass Index (BMI) and the development of type 2 diabetes. These results also align with the theory that high BMI carries a two-fold greater risk of developing type 2 diabetes compared to low BMI. The accumulation of body fat, particularly visceral fat, leads to increased insulin resistance, which impairs glucose uptake by peripheral tissues and increases blood glucose levels (ADA, 2024).

The therapy of antidiabetic medication use is shown in the following table 2.

Table 2. Characteristic

No	Therapy	Frequency (n)	Percentage (%)
1	Single	38	29,2
2	2 Combination	87	66,9
3	3 Combination	5	3,9
Total		130	100

Based on Table 2, it can be seen that the most common antidiabetic medication use pattern among inpatients with diabetes at Sunan Kudus Islamic Hospital during 2025 was a combination of two drugs, with 87 patients (66.9%), compared to single therapy and a combination of three drugs, which were used in only 38 patients (29.2%) and 5 patients (3.9%), respectively.

Type 2 diabetes is a progressive disease, characterized by decreased pancreatic β -cell function and increasing insulin resistance over the course of the disease. The use of two antidiabetic drugs with different mechanisms of action can provide complementary effects, resulting in more optimal blood glucose reduction (Dangur *et al.*, 2023).

According to PERKENI (2024), the goal of combination therapy is to increase the effectiveness of blood glucose control, target various pathophysiological mechanisms of diabetes, and prevent disease progression earlier. Single therapy reduces the likelihood of side effects, adapts to the patient's profile, and improves patient compliance.

Table 3. Blood Glucose Before and After

No	Blood Glucose Before (mg/dL)	Frequency (n)	Percentage (%)
1	>200	117	90
2	140-199	13	10
3			
	Blood Glucose After (mg/dL)	Frequency (n)	Percentage (%)
1	>200	4	3,1
2	140-199	20	15,3
3	<140	106	81,6
Total		130	100

Based on the table above, laboratory data for patients' blood glucose levels before treatment at Sunan Kudus Islamic Hospital in 2025 showed that most patients (90%) had random blood glucose levels ≥ 200 mg/dL. This indicates that most patients presented with uncontrolled hyperglycemia. These results indicate that patients require more intensive antidiabetic therapy during hospitalization, especially if accompanied by acute complications or comorbidities.

Hyperglycemia is caused by the progression of type 2 diabetes, which is characterized by decreased pancreatic β -cell function and increased insulin resistance, thereby decreasing the body's ability to maintain glucose homeostasis (DeFronzo *et al.*, 2022).

Based on the table above, laboratory data for post-treatment random blood glucose levels in inpatients at Sunan Kudus Islamic Hospital in 2025 showed that the most common reading was <140 mg/dL, with 106 patients (81.6%). Therefore, the results of this study indicate that antidiabetic therapy administered during hospitalization was effective in achieving glycemic control in the majority of patients. This reduction in blood glucose levels indicates that the patients' hyperglycemia was improved during treatment.

The reduction in blood glucose levels is influenced by the administration of therapy appropriate to the patient's clinical condition, regular blood glucose monitoring, nutritional management during treatment, and management of comorbidities that can exacerbate hyperglycemia. Good glycemic control during treatment is essential to mitigate the effects of glucose toxicity, improve insulin sensitivity, and reduce the inflammatory response to hyperglycemia, thus stabilizing the patient's metabolic condition (Pasquel & Umpierrez, 2022).

The effectiveness of medication use in lowering blood glucose in type 2 diabetes patients is as follows: use is shown in the following table 3:

Table 4. Effectiveness of Antidiabetic

No	Therapy	Drugs	Blood Glucose	Persentase
1	Single	Acarbose 50 mg	173	51.8
2	2 Combination	Glimepiride 2 mg and Sansulin	162	58.1
3	3 Combination	Acarbose 100 mg, Glimepiride 2 mg, and Metformin	204	62,6

Based on Table 4, antidiabetic therapy administered to inpatients with type 2 diabetes at Sunan Kudus Islamic Hospital in 2025, it shows that all regimens, including single therapy, two-drug combinations, and three-drug combinations, were effective in lowering random blood sugar levels (GDS). GDS reductions varied, with combination therapy demonstrating greater effectiveness than single therapy. Single therapy is effective in newly diagnosed type 2 diabetes.

Acarbose more effective in newly diagnosed T2DM patients with low FPG, low 2 h PG and obesity. The earlier T2DM is diagnosed and continuously treated with acarbose, the better the response to therapy (Zhang *et al.*, 2022). These results are also supported by Gu *et al.* (2022) through a systematic review and meta-analysis regarding monotherapy options for patients who cannot take metformin. The review stated that α -glucosidase inhibitors, including acarbose, are an effective alternative to monotherapy in lowering HbA1c and postprandial glucose, compared to metformin. However, its good safety profile, minimal risk of hypoglycemia, and neutral effect on body weight mean that acarbose still has an important role in the management of type 2 diabetes mellitus under certain conditions.

Combination therapy acts on various pathophysiological mechanisms of diabetes, resulting in faster and greater reductions in blood glucose levels than monotherapy. Good glycemic control indicates that DM patients are still responding adequately to therapy and maintaining adequate pancreatic β -cell function (ADA, 2022). The ADA guidelines (2025) recommend a target blood sugar level for inpatients in the range of 100–180 mg/dL to avoid the risk of hypoglycemia. Therefore, patients in this study who had GDS levels in the range of 140–199 mg/dL can still be considered to have experienced clinical improvement, especially when compared to the hyperglycemic condition at hospital admission, although they still require evaluation and therapy adjustments to achieve more optimal targets. The normal GD2PP value is <140 mg/dL, while HbA1c reflects the average blood glucose level over the past $\pm$ 2–3 months because it is formed through the non-enzymatic glycation of hemoglobin in erythrocytes. A normal HbA1c value is <5.7% (ADA, 2024).

CONCLUSION

Antidiabetic drugs are effective in lowering blood glucose levels in patients with type 2 diabetes mellitus at Sunan Kudus Islamic Hospital in 2025.

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