ORIGINAL RESEARCH

Volume 1, No. I, 21, August, 2025, (Page 032-037)
eISSN: XXXX-XXXX, pISSN: XXXX-XXXX
https://journal.nursinggeniuscare.co.id/index.php/JGHPR/index

ANALYSIS OF DIRECT MEDICAL COSTS ON TYPE II DIABETES MELLITUS OUTPATIENT MUSTIKA MEDIKA HOSPITAL

Diah Permatasari[1], Dewi Yuliana Idris[2*], Iin Ruliana Rohenti[3], Silfera Indra Yanti[4]

Affilitions

[1,2,3,4]Bani Saleh University, Indonesia,

Article Info

Article History:
Received: July 31, 2025
Revised: August 14, 2025
Accepted: August 31, 2025

Keywords:
Diabetes Mellitus, Direct Medical Costs, Outpatient.

Corresponding Author:
Dewi Yuliana Idris[2], (Bani Saleh University, Indonesia),

Email:
dyifarmasi@gmail.com

Abstract

Background : Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by hyperglycemia resulting from abnormalities in insulin secretion or action. The high prevalence of type 2 DM has become a major global health concern, necessitating economic evaluations to assess the cost burden of treatment. **Purpose**: This study aimed to analyze the direct medical costs associated with outpatient management of type 2 DM at Mustika Medika Hospital. **Method**: A descriptive, retrospective design was employed using medical record data of patients treated between January and December 2020. **Results**: The results showed that the average direct medical costs were IDR 410,429 for glimepiride, IDR 393,130 for metformin, IDR 281,700 for acarbose, and IDR 628,065 for combination therapy with metformin and glimepiride. The highest cost was observed in combination therapy (IDR 628,065), whereas the lowest cost was associated with acarbose therapy (IDR 281,700). **Conclusion**: These findings provide valuable insights into the economic aspects of type 2 DM pharmacotherapy, which may support healthcare providers and policymakers in optimizing treatment strategies.

Background

Diabetes Mellitus (DM) is a non-communicable disease (NCD) that has gained increasing global attention over the past decade. It is a chronic metabolic disorder characterized by hyperglycemia due to impaired glucose metabolism, resulting from absolute or relative insulin deficiency. Globally, DM represents a significant contributor to morbidity, mortality, and healthcare costs.

In Indonesia, DM ranks as the third leading disease contributing to household economic burden, amounting to USD 0.81 billion, after heart disease (USD 1.56 billion) and hypertension (USD 1.36 billion), followed by stroke (USD 0.29 billion). These data, derived from household out-of-pocket expenditures in 2010, indicated a substantial financial impact. By 2020, this burden was projected to increase by 56.0% (USD 1.27 billion) for DM, 34.4% (USD 2.09 billion) for heart disease, 46.6% (USD 1.99 billion) for hypertension, and 56.9% (USD 0.45 billion) for stroke (1).

Previous studies have highlighted the considerable costs of diabetes care. Wicaksana (2019) reported that over a three-year period, direct medical costs amounted to IDR 55,121,000, while indirect costs were IDR 28,644,000. Furthermore, Dyah et al. (2014) at Dr. Moewardi Surakarta Regional General Hospital demonstrated that direct medical costs represented the

major contributors. In group 2 patients, the average cost was IDR 3,828,282, with medications (27.54%), laboratory tests (23.02%), and procedures (19.00%) comprising the largest proportions.

Given the high and growing prevalence of type 2 DM, economic evaluations from the healthcare provider perspective are crucial to inform cost-effective strategies. Mustika Medika Hospital, a private hospital with a significant number of type 2 DM patients, provides a relevant setting for such analysis. This study therefore aimed to evaluate the direct medical costs of oral antidiabetic drug therapy for outpatients with type 2 DM at Mustika Medika Hospital. Specifically, this study sought to: (1) describe the demographic characteristics of type 2 DM outpatients without complications based on age, sex, and medications used; and (2) analyze the direct medical costs, including medication, laboratory, and physician fees.

Method

This study employed an observational, non-experimental design using a descriptive approach. Data collection was retrospective, based on medical and financial records of outpatients diagnosed with type 2 DM without complications at Mustika Medika Hospital, Bekasi City. Data sources included the Casemix medical records unit (diagnosis grouping) and the Outpatient Pharmacy Department. The study was conducted between July and August 2021, with the analysis period covering January–December 2020.

A purposive sampling technique was applied. From a total population of 309 type 2 DM outpatients, 76 patients without complications were included in the sample. Study variables included patient demographics, direct medical costs, and average direct medical costs associated with oral antidiabetic drug therapy.

Data were processed and analyzed using Microsoft Excel and SPSS version 22. Descriptive statistics were used to summarize demographic characteristics and cost components, which were categorized into medication costs, laboratory costs, and physician fees.

Results

Table 1. Gender characteristics of Type II Diabetes Mellitus (DM) Hospital

Gender	Frequency (N=76)	Percentage (%)
Man	31	40,8
Woman	45	59,2

Table 2. Age characteristics of Type II Diabetes Mellitus (DM) patients

Age (year)	Frequency (N= 76)	Percentage (%)
36 – 45	26	34,2
46 – 55	36	47,4
56 – 65	11	14,5
> 65	3	3,9

Table 3. Types of medication used by Type II Diabetes Mellitus (DM) patients

Drug Therapy	Frequency (N= 76)	Percentage (%)
Biguanide		
Metformin	27	35,5%
Sulfonilurea		
Glibenclamide	0	0%
Glipizide	0	0%
Gliclazide	0	0%
Glimepiride	21	27,6%
Alpha-glucosidase inhibitor		
Acarbose	5	6,6%
Combination therapy		
Sulfonilurea+ Biguanide	23	30.3%
Glimepiride+ Metformin	0	0%
Sulfonilurea+ Glinid		

Table 4. Average Annual Drug Costs for Type II Diabetes Mellitus (DM) Patients

Treatment Profile	Frequency (N= 76)	Drug costs
Glimepiride	21	Rp. 45.905
Metformin	27	Rp. 49.370
Metformin+ Glimepiride	23	Rp. 115.043
Acarbose	5	Rp. 51.600

Table 5. Average Annual Doctor's Fees for Type II Diabetes Mellitus (DM) Patients

Treatment Profile	Frequency (N= 76)	Doctor's Fees
Glimepiride	21	Rp. 148.095
Metformin	27	Rp. 193.704
Metformin+ Glimepiride	23	Rp. 225.652
Acarbose	5	Rp. 166.000

Table 6. Average Annual Laboratory Costs for Type II Diabetes Mellitus (DM)

Treatment Profile	Frequency (N= 76)	Lab Fees
Glimepiride	21	Rp. 216.429
Metformin	27	Rp. 150.056
Metformin+ Glimepiride	23	Rp. 287.370
Acarbose	5	Rp. 64.100

Table 7. Average Direct Medical Costs per Year for Type II Diabetes Mellitus (DM) Patients

Treatment Profile	Frequency (N= 76)	Average
Glimepiride	21	Rp. 410.429
Metformin	27	Rp.393.130

Metformin+ Glimepiride	23	Rp. 628.065
Acarbose	5	Rp. 281.700

Discussion

This study aimed to determine the direct medical costs of oral antidiabetic drugs in outpatients with type II diabetes mellitus (DM) at Mustika Medika Hospital. Data collection was conducted retrospectively, and the sample consisted of patients diagnosed with type II DM without complications for at least one year who received oral antidiabetic therapy and met the inclusion criteria. A total of 309 patients were identified, of whom 76 met the inclusion criteria.

Based on **Table 1**, analysis of gender distribution showed that 31 patients (40.8%) were male and 45 patients (59.2%) were female. These findings indicate a higher prevalence of DM among women compared to men. This is consistent with the study by Hongdiyanto et al. (2014), which reported that the prevalence of DM was higher in females than in males. Similarly, Prasetyani (2017) explained that the higher incidence in women may be related to body composition differences and sex hormone levels. Women typically have more adipose tissue (20–25% of body weight) than men (15–20%), increasing their risk of DM. Rasdianah and Gani (2021) also noted that DM is more common among women due to menopausal and premenopausal transitions, in addition to contributing factors such as reduced physical activity, unhealthy lifestyles, and stress.

Based on **Table 2**, the largest age group was 46–55 years, accounting for 36 patients (47.4%). This finding aligns with Istiqomatunnisa (2014), who reported that increasing age, particularly after 30 years, is associated with anatomical, physiological, and biochemical changes that affect glucose tolerance and homeostasis. Khairinnisa et al. (2020) also reported that individuals aged 45–55 years are at significantly higher risk of developing DM due to declining pancreatic function and reduced insulin production, with a six-fold increased risk in those over 45 years.

Based on **Table 3**, oral antidiabetic drugs used in type II DM patients included three monotherapies (metformin, glimepiride, and acarbose) and one combination therapy (metformin + glimepiride). Metformin monotherapy was the most frequently prescribed, used in 27 patients (35.5%). Glimepiride was used in 21 patients (27.6%) and acarbose in 5 patients (6.6%). Metformin remains the first-line therapy for type II DM due to its ability to reduce hepatic glucose production and improve insulin sensitivity. Its advantages include low cost and minimal risk of hypoglycemia; however, it may cause gastrointestinal side effects, vitamin B12 deficiency, and is contraindicated in patients with significant renal or hepatic impairment (13).

Based on **Table 4**, the average annual drug costs were as follows: glimepiride IDR 45,905, metformin IDR 49,370, acarbose IDR 51,600, and metformin + glimepiride combination IDR 115,043. Glimepiride had the lowest drug cost, making it a suitable option for patients with limited financial resources. As a sulfonylurea, glimepiride effectively reduces blood glucose but carries the risk of weight gain and hypoglycemia (13). The combination of metformin and glimepiride, while more costly, was found to provide greater efficacy in reducing fasting and postprandial glucose, HbA1c, and lipid abnormalities, thereby lowering cardiovascular risk (10). Acarbose was the least prescribed, but its use is beneficial in patients with high

carbohydrate intake as it lowers postprandial glucose without causing hypoglycemia, though gastrointestinal side effects are common.

Based on **Table 5**, the average annual physician consultation fees were highest in patients receiving combination therapy (IDR 225,652), followed by metformin (IDR 193,704), acarbose (IDR 166,000), and glimepiride (IDR 148,095). Physician fees varied according to the complexity of therapy and hospital standards.

Based on **Table 6**, the average annual laboratory costs were highest for the metformin + glimepiride combination (IDR 287,370), followed by glimepiride (IDR 216,429), metformin (IDR 150,056), and acarbose (IDR 64,100). Laboratory costs for combination therapy were higher due to the need for more frequent monitoring to evaluate treatment effectiveness and prevent complications. Acarbose therapy incurred the lowest laboratory costs, consistent with its role as an alternative therapy for postprandial hyperglycemia (Perkeni, 2015).

Based on **Table 7**, the total average direct medical costs per year were highest for the metformin + glimepiride combination (IDR 628,065) and lowest for acarbose monotherapy (IDR 281,700). Although acarbose therapy incurred the lowest costs, it was also the least utilized due to its relatively modest efficacy in lowering HbA1c (0.5–0.8%) compared to metformin (1.0–1.3%).

Conclusion

Outpatients with type II DM at Mustika Medika Hospital during January–December 2020 were predominantly female (59.2%) and aged 46–55 years (47.4%). Metformin was the most frequently prescribed oral antidiabetic drug.

The analysis of direct medical costs showed that metformin + glimepiride combination therapy incurred the highest annual average direct medical cost (IDR 628,065), while acarbose monotherapy had the lowest (IDR 281,700). Laboratory costs represented the largest proportion of total costs, particularly for combination therapy. These findings highlight the economic burden of type II DM management and suggest the need for cost-effective prescribing practices to optimize patient outcomes while minimizing healthcare expenditures.

References

1. Aisyah, T. M. (2006). Cost analysis Of Diabetes mellitus therapy In Dr. Sardjito Hospital Yogyakarta. *Indonesian Journal of Pharmacy*, *17*(Vol 17 No 3, 2006),130–135.
2. Andayani, T. M. (2013). *Farmakoekonomi Prinsip Dan Metodologi*. Bursa Ilmu.
3. Depkes, R. (2010). *Profil Kesehatan Republik Indonesia*.
4. Dyah, R. I., Wahyono, D., & Andayani, T. M. (2014). Analisis Biaya Terapi Pasien Diabetes Melitus Rawat Inap. *Jurnal Manajemen Dan Pelayanan Farmasi (Journal of Management and Pharmacy Practice)*, *4*(1), 55–62. https://doi.org/10.22146/jmpf.257
5. Finkelstein, E. A., Chay, J., & Bajpai, S. (2014). The economic burden of self-reported and undiagnosed cardiovascular diseases and diabetes on Indonesian households. *PLoS ONE*, *9*(6). https://doi.org/10.1371/journal.pone.0099572
6. Hongdiyanto, A., Yamlean, P. V. Y., & Supriati, S. (2014). Evaluasi Kerasionalan Pengobatan Diabetes Melitus Tipe 2 Pada Pasien Rawat Inap Di Rsup Prof. Dr. R. D. Kandou Manado Tahun

2013. *Pharmacon, 3*(2), 77–87. https://doi.org/10.35799/pha.3.2014.4775

7. Istiqomatunnisa. (2014). Rasionalitas Penggunaan Obat Anti Diabetes Dan Evaluasi Beban Biaya Perbekalan Farmasi Pada Pasien Rawat Inap Kartu Jakarta Sehat Di Rumah Sakit Tni Angkatan Laut Dr. Mintohardjo.
8. Kemenkes Ri. (2013). *Pedoman Surveilans Penyakit Tidak Menular Kementerian Kesehatan Ri*. 1–31.
9. Khairinnisa, A., Ysmaini, H., & Hadiwirjo, Y. H. (2020). Perbandingan Penggunaan Glibenclamid-Metformin dan Glimepirid-Metformin Terhadap Efek Samping Hipoglikemia Pasien Diabetes Melitus Tipe-2 di Kota Tangerang Selatan Bulan Januari–Oktober Tahun 2019. *Seminar Nasional Riset Kedokteran, 4*(2), 147–154.
10. Furdiyanti, N. H., Luhurningtyas, F. P., Ratna, S., & Yulianti. (2017). *Evaluasi Dosis Dan Interaksi Obat Antidiabetika Oral Pada Pasien Diabetes Mellitus Tipe Ii Evaluation Of Oral Antidiabetic Dosing And Drug Interactions In Type Ii Diabetic Patients*. *7*(Dm), 191–196.
11. Kumala Swandari, M. T., Maryanti, D., A'yuni, Q., & Calista Cahyani, D. (2018). *Jurnal Ilmiah Kefarmasian.* 64–68.
12. Notoatmodjo, S. (2012). *Metodologi Penelitian Kesehatan Hlm: 1-236.* Rineka Cipta.
13. Perkeni. (2015). Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia. *Perkumpulan Endokrinologi Indonesia*, 1–117.
14. Prasetyani, D. (2017). Analisis Faktor Yang Mempengaruhi Kejadian Diabetes Melitus (Dm) Tipe 2. *Analisis Faktor Yang Mempengaruhi Kejadian Diabetes Miletus Tipe 2*, *2*(2), 1–9.
15. Rasdianah, N., & Gani, A. S. W. (2021). Interaksi Obat Pada Pasien Diabetes
16. Melitus Tipe 2 Dengan Penyakit Penyerta Di Rumah Sakit Otanaha Kota Gorontalo. *Indonesian Journal of Pharmaceutical Education, 1*(1), 40–46. https://doi.org/10.37311/ijpe.v1i1.9953
17. Riskesdas. (2018). *Hasil Utama Riset Kesehata Dasar (RISKESDAS)*.
18. Sari, R. N. (2012). *Diabtetes Mellitus*. Nuha Medika.
19. Syamsiyah, N. (2017). *Berdamai Dengan Diabetes* T. B. Medika
20. Wicaksana. (2019). Analisis Biaya Rata-Rata Pasien Rawat Inap Dengan Penyakit Diabetes Mellitus Type Ii. *Jurnal Lingkungan & Pembangunan, Oktober 2019, 3*(2), 22–23.
21. World Health Organization., 2016., & WHO, G. R. on D. F. : (2016). *Global Report On Diabetes*. 88.
22. Yuswantina, R., & Dyahariesti, N. (2018). Analisis Efektivitas Biaya Penggunaan Antidiabetes Oral Tunggal dan Kombinasi Pada Pasien BPJS Penderita Diabetes Melitus Tipe 2 di Rumah Sakit X. *Media Farmasi Indonesia, 13*(1), 1340–1346.