Cost Analysis Monotherapy of Type 2 Diabetes Mellitus Patients in RSUD. Prof. Dr. Margono Soekarjo

Fajar Wahyu Pribadi[1][a], Afifah[1][b], and Catharina Widiartini[2][c]
[1] *Department of Pharmacology, Faculty of Medicine, Universitas Jenderal Soedirman, Purwokerto, Indonesia*
[2] *Department of Anatomy, Faculty of Medicine, Universitas Jenderal Soedirman, Purwokerto, Indonesia*

Keywords: cost analysis, type 2 diabetes mellitus, INA-CBG's rates, monotherapy, effectiveness.

Abstract: Type 2 Diabetes Mellitus (D.M.) is a metabolic syndrome characterized by hyperglycemia due to decreased insulin sensitivity. High prevalence and long-term treatment to be burdened on the health economy indicate that D.M. therapy must be cost-effective. The study aimed to know the cost analysis monotherapy of type 2 Diabetes Mellitus patients. Twenty-three patients without complications were given monotherapy and followed six months from D.M.'s initial diagnostic in a descriptive study. Data was taken from medical records, clinical pathology laboratory and finansial data between January 1, 2016, and June 30, 2018. The cost analysis therapy was compared between monotherapy Insulin, Metformin, Glimepiride and Pioglitazone. Of the 23 patients monotherapy of the study population, nine patients received Insuline; 8 patients received Metformin; 3 patients received Glimepirid, and three patients received Pioglitazone. The analysis showed that the total cost INA-CBG's rates Rp9.0189 million; Rp7.9648 million; Rp2.9609 million and Rp2.9633 million. Effectiveness therapy rates 44.44%; 70.83%; 50% and 66.67%. CER Rp202925; Rp112444; Rp59218 and Rp44449. As a conclusion, Pioglitazone is more cost-effective when compared to Insulin, Metformin and Glimepiride. Our findings suggest it needed to assess the total costs effectiveness of therapy with more and longer periods.

1 INTRODUCTION

Type 2 Diabetes Mellitus is caused by insulin insensitivity to the cells. It requires long-term therapy to reduce the risk of complications (ADA, 2015). The prevalence of D.M. in Indonesia is 6.2% or 10.7 million sufferers, and it is estimated that in 2035 it will increase to 14.1 million sufferers (IDF, 2020). Data from the 2015 World Economic Forum, Indonesia has the potential to experience losses due to non-communicable diseases such as diabetes mellitus for the 2012-2030 period of 34.47 trillion dollars, and specifically, in 2015, 33% of JKN expenditure was used to finance health care for diabetes mellitus and its complications (Kemenkes, 2016). In research conducted at UPT. Puskesmas Dawan II in Klungkung Regency in 2015-2016, apparently there is no significant difference in the effectiveness of the drugs given (Udayani dan Herleeya, 2016). The high incidence of D.M. cases, high D.M. health care costs and no significant difference in the effectiveness of the drug will affect the analysis of the cost of two-drug combination therapy in type 2 Diabetes Mellitus patients. By knowing this analysis, it can provide input in selecting the most cost-effective drug in the therapy.

2 MATERIALS AND METHODS

This descriptive study used a total sampling method from all the secondary data archives of medical records, financial records (INA-CBGs) and clinical pathology laboratory of Prof. Dr Margono Soekarjo Purwokerto. Patient of Type 2 Diabetes Mellitus without complications from a BPJS (national health insurance) participant followed for the next six months. The variables used were the type of drug

[a] https://orcid.org/0000-0002-9706-8110
[b] https://orcid.org/0000-0002-5703-7061
[c] https://orcid.org/0000-0002-2789-5292

Pribadi, F., Afifah, . and Widiartini, C.
Cost Analysis Monotherapy of Type 2 Diabetes Mellitus Patients in RSUD. Prof. Dr. Margono Soekarjo.
DOI: 10.5220/0010488100810083
In *Proceedings of the 1st Jenderal Soedirman International Medical Conference in conjunction with the 5th Annual Scientific Meeting (Temilnas) Consortium of Biomedical Science Indonesia (JIMC 2020)*, pages 81-83
ISBN: 978-989-758-499-2

given, the Cost of therapy, and the Effectiveness of blood sugar levels.

3 RESULTS

From January 1, 2016, to December 31, 2017, twenty-three new patients were on combination therapy with two drugs. These diabetes mellitus patients were then followed for the next six months.

Characteristics of type 2 Diabetes Mellitus patients, including gender, age, Body Mass Index (BMI), and type of drugs were presented in Table 1.

Table 1. Characteristics

	n	%
Gender		
Man	10	43,5
Woman	13	56,5
Age		
<50	5	21,74
50-59	9	39,13
≥60	9	39,13
IMT		
Underweight	3	13,04
Normal	4	17,39
Overweight	7	30,44
Obesitas	9	39,13
Monotherapy		
Insulin	9	39
Metformin	8	35
Glimepiride	3	13
Pioglitazone	3	13

Total Cost Based On INA-CBGs of type 2 Diabetes Mellitus patients were presented in Table 2.

Table 2. Total cost (in thousands of rupiah)

Drugs	n	Total	Mean	Med	Min	Max
Insulin	9	9.018,9	143,16±12,03	142,2	135,9	198,9
Metformin	8	7.964,8	142,23±10,89	142,2	135,9	183,3
Glimepiride	3	2.960,9	140,99±14,68	142,2	135,9	202,5
Pioglitazone	3	2.963,3	141,11±8,63	142,2	135,9	165,4

Effectiveness Therapy Rates of type 2 Diabetes Mellitus patients were presented in Table 3.

Table 3. Effectiveness therapy rates

Drugs	n	Reach the target	Total examination	%
Insuline	9	24	54	44,4
Metformin	8	34	48	70,83
Glimepirid	3	9	18	50
Pioglitazon	3	12	18	66,67

Cost-Effectiveness Ratio of type 2 Diabetes Mellitus patients, as presented in Table 4.

Table 4. Cost-Effectiveness Ratio (in thousands of rupiah)

Drugs	CER
Insuline	202,925
Metformin	112,444
Glimepiride	59,218
Pioglitazone	44,449

4 DISCUSSIONS

This characteristic is under research from Lestari (2013) in a study conducted at Fatmawati General Hospital in 2012 which shows that the distribution of Type 2 Diabetes Mellitus sufferers is more dominated by women and research from Gautam (2009) regarding the quality of life of type 2 D.M. patients in India also has results. Most of the sufferers are female. According to the American Diabetes Association (ADA), gender may be an indirect risk factor for D.M. since their personalities like lack of physical activity, obesity, and a history of diabetes during pregnancy (PERKENI, 2015; Smeltzer *et al.*, 2008).

This age characteristic is slightly different from Lestari's research (2013) conducted at Fatmawati General Hospital in 2012, which shows that at the age of 50-59 years, the most Type 2 Diabetes Mellitus sufferers are 35%. However, according to Smeltzer *et al*. (2008), insulin resistance in type 2 diabetes mellitus tends to increase in the elderly or aged 40-65 years.

This BMI characteristic follows Lestari's (2013) research, which shows that the distribution of Type 2 Diabetes Mellitus sufferers is more dominated by obesity by 38%. Obesity is one of the risk factors for type 2 Diabetes Mellitus. Due to overweight or obesity, fat cells are also fat, and cells like this will produce several substances classified as adipocytokines which are more in number. These

substances cause resistance to insulin (Smeltzer *et al.*, 2008; Hartini, 2009).

In this study, the effectiveness of therapy was similar according to Priharsi (2015) research at Dr Moewardi Surakarta in 2014, which stated that Metformin had the highest effectiveness (58.33%) to other drugs. And according to the American Diabetes Association (2015), Metformin is safe for the elderly, accompanied by decreased physiological function.

For CER data, when compared with each therapy, the most cost-effective is Pioglitazone therapy because the cost of this therapy is cheaper than other therapies. And according to Jameson (2012) and Nathan, *et al.* (2008) Pioglitazone can reduce insulin resistance by binding to the gamma Peroxisome Proliferator Activator receptor (PPAR-gamma) found in muscles, fat tissue, liver, and vascular.

5 CONCLUSIONS

Pioglitazone is more cost-effective when compared to Insulin, Metformin, and Glimepiride. However, further research is needed with a larger sample, over a more extended period and using GD2PP and HbA1C

ACKNOWLEDGMENTS

I am grateful to Lantip Rujito for writing this article, Director of RSUD Prof. Dr Margono Soekarjo, Dean and Head of the Pharmacology Section of the Faculty of Medicine and Head of LPPM, Jenderal Soedirman University, for allowing this research to be carried out.

REFERENCES

American Diabetes Association (ADA), 2015. *Standards of Medical Care in Diabetes-2015*. Diabetes Care 2015 Jan; 38 (Supplement 1): S4. https://doi.org/10.2337/dc15-S003

Gautam, Y., 2009. A Cross-Sectional Study of QOL of Diabetic Patient at tertiary Care Hospital in Delhi. *Indian Journal of Community Medicine*., 34(4): 346-350.

Hartini, S., 2009. *Diabetes Siapa Takut, Panduan Lengkap untuk Diabetes, Keluarganya dan Profesional Medis*. Penerbit Buku Qanita, Jakarta.

International Diabetes Federation (IDF), 2020, *Diabetes Atlas,* https://www.idf.org/our-network/regions-members/western-pacific/members/104-indonesia.html

Jameson, J.L., 2012. *Harrison Endocrinology* Ed 2. USA: McGraw-Hill Companies, Inc. 267-313.

Kemenkes RI, 2016. *Mari Kita Cegah Diabetes dengan Cerdik (online), https://www.kemkes.go.id/article/print/16040700002/ menkes-mari-kita-cegah-diabetes-dengan-cerdik.html.*

Lestari, W.P., 2013, Gambaran Efektivitas Penggunaan Obat Antidiabetik Tunggal dan Kombinasi dalam Mengendalikan Gula Darah Pada Pasien Diabetes Mellitus Tipe 2 di RSUP Fatmawati Tahun 2012. UIN Syarif Hidayatullah, Jakarta.

Nathan, M.N., J.B. Buse, B.D. Mayer, E. Ferrannini, R.R. Holman, R. Sherwin, *et al*. 2008. Medical management of Hyperglycemia in Type 2 Diabetes A consensus Algorithm for the Initiation and Adjustment of Therapy. A consensus statement of the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care 2008*. 31:1-11.

Perkumpulan Endokrinologi Indonesia (PERKENI), 2015. *Konsensus Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia 2015,* PB PERKENI. Jakarta.

Priharsi, A., 2015. *Analisis Efektivitas Biaya Antidiabetik Oral pada Penderita Diabetes Melitus Tipe 2 Rawat Jalan Peserta Bpjs di Rumah Sakit Umum Daerah Dr. Moewardi Tahun 2014*, Universitas Muhammadiyah Surakarta.

Smeltzer,S.C., E. Monica, B. Bare, A. Waluyo, 2008. *Buku Ajar Keperawatan Medikal Bedah Brunner dan Suddart,* EGC. Jakarta.