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RESEARCH ARTICLE
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Cost Minimization Analysis of Oral Antidiabetic Drugs in Type II Diabetes Mellitus Patiens at Sultan Suriansyah Hospital January-December 2022 Period

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Abstract:

Diabetes According to WHO (2016) is a serious chronic disease that occurs when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. The high cost of treating DM patients is reaching USD 1,500 to 9,000 in developing countries. The difference in costs for oral antidiabetics and the high cost analysis method. This study aims to determine the minimum cost between metformin 500 mg and acarbose 100 mg drugs in Sultan Suriansyah Banjarmasin in adult patients. This research was conducted using a cross-sectional design based on medical records and detail of patient costs in January-December 2022. The number of sample in this study were 39 patients. The statistic analysis used in study is the Mann-Whitney test and the Independent T-Test. The result of the analysis of cost minimization based on the average total cost of therapy are Rp 419,560 for metformin 500ng and Rp 680,922 for acarbose 100 mg with a probability value > 0.05 for the cost of co morbidities which means that there is no significant difference between the two drugs. Probability value < 0.05 for antidiabetic oral drug costs, lab costs and total therapy costs which means the there is a significant difference between the two drugs. Conclusion in this study is aral antidiabetic therapy for minimal diabetes mellitus is metformin compared to acarbose.

Keywords: Acarbose; Cost Minimization Analysis; Diabetes mellitus; Metformin

Introduction

Diabetes mellitus is a disease that occurs as a result of decreased organ function (degenerative), especially disorders of the pancreas organ in producing the hormone insulin, so that DM cases will increase in line with increasing age and its complications will result in an increase in the amount of treatment costs for diabetes mellitus patients.[1] Diabetes mellitus is one of the main health problems in the community which has long and short term complications. There are 4 types of diabetes, namely type 1 DM, type 2 DM, gestational DM, and other types of DM.[2]

The International Diabetes Federation (IDF) estimates that at least 436 million people aged 20-70 years in the world have diabetes in 2019, or the equivalent of a prevalence rate of 9.3% of the total population at the same age. The prevalence of diabetes is expected to increase as the population ages to 19.9% or 111.2 million people aged 65-79 years. The number is predicted to continue to increase until it reaches 578 million in 2030 and 700 million in 2045. Diabetes Mellitus is included in the 10 most common diseases and is ranked 2nd most in South Kalimantan with the highest cases found in the City of Banjarmasin. The number of diabetes mellitus cases in 2020 in South Kalimantan and those who have received standard health services are 52,307 sufferers with a percentage of 67.1% .[3]

Diabetes Mellitus is a disease that ranks 8th out of the 10 biggest diseases in the Sultan Suriansyah Hospital, Banjarmasin with a total of 452 cases with 157 cases in males and 295 cases in females with a total number of visits of 1,307 times.

Management to be able to improve the quality of life of patients with diabetes mellitus as well as improve quality of life and reduce the risk of complications in order to reduce patient morbidity and mortality, it is necessary to control blood glucose, blood pressure, weight and lipid profile through comprehensive patient management.[4] Based on the guidelines for the management and prevention of type 2 diabetes mellitus in Indonesia from PERKENI 2021, monotherapy options that can be given to patients are metformin, sulfonylurea/glinid, alpha-glucosidase inhibitors, thiazolidinediones, DPP-IV inhibitors, SGLT-2 inhibitors, and GLP-1 agonists.[5]

According to the International Diabetes Federation (IDF) in 2012 it was explained that in Indonesia the cost of treating DM patients was only around USD 80.22 per DM patient/year, while in other developing countries the cost of treating DM cases was around USD 50-2,000 per DM patient. / year and in developed countries the cost of treatment reaches USD 1,500-9,000 per patient DM / year.[1]

The large number of oral antidiabetic drug choices and the varying costs, causes patients to be more focused on choosing effective therapy with relatively low costs. Therefore, special thoughts are needed in increasing efficiency or rational use of funds. Pharmacoeconomics with the Cost Minimization Analysis method as a forum for increasing efficiency and mobilizing financial resources that can be used to help develop specific ideas without neglecting the social aspects of the health sector itself. The cost minimization analysis method is one method that can be used to be able to compare costs with two or more interventions that aim to identify alternative treatments with the lowest cost but with equivalent treatment outcomes. Research on pharmacoeconomics conducted by analyzing the minimum cost of oral drugs used during the process of pharmacological therapy for type II Diabetes Mellitus at Sultan Suriansyah General Hospital, Banjarmasin.

Research Method

Research Design

The research method used in this study is the Analytical Observational method with a

Cross Sectional design. This research was conducted at the outpatient installation of Sultan Suriansyah Hospital, Banjarmasin City using medical record documentation and details of patient costs during the treatment period.

Population and Sample in Research

The population used in this study were all patients diagnosed with type 2 diabetes mellitus in outpatient installations from January to December 2022. The sample used in this study was 39 patients, this sampling was in accordance with the inclusion and exclusion criteria determined by the researcher, namely Patients aged 26-45 years, without complications, received monotherapy, namely metformin 500 mg or acarbose 100 mg.

Instrument in Research

The data collection instrument used in this study is to use patient medical records and details of costs incurred by patients during treatment in the 2022 period.

Data Analysis

Technical analysis in this study used the cost analysis formula which was then processed with statistical tests to determine the difference between the two test groups, namely by using the Mann-Whitney test and the Independent T-Test.

Results

Patient Characteristics

Patient characteristics analyzed in this study were patient gender, patient age and patient therapy. In table 1 it can be seen that the total for each sex of the 39 patients who were the sample of this study was 8 patients (20.5%) for men while for women it was higher, namely 31 patients (79.5%). There are two age categories in this study, namely the first with the 26 to 35 years category and the second 36 to 45 years which can be seen from table 2 with very different numbers, namely for the 26 to 35 year age category there were 5 patients (12.8%) while at the age of 36 to 45 years there were 34 patients (87.2%). The antidiabetics used in this study were metformin 500 mg and acarbose 100 mg. The amount of each of the two antidiabetics used can be seen from table 3, namely for metformin 500 mg there were 26 patients (66.7%) while for acarbose 100 mg there were 13 patients (33.3%).

Table 1 Patient Characteristics Based on Gender

Gender	Quantity	Percentage
Male	8	20.5%
Female	31	79.5%
Total	39	100%

Table 2 Patient Characteristics Based on Patient Age

Age	Quantity	Percentage
26 – 35	5	12.8%
36 - 45	34	87.2%
Total	39	100%

Table 3 Data on the Amount of Antidiabetic Use

Therapy	Quantity	Percentage
Metformin 500 mg	25	66.7%
Acarbose 100 mg	13	33.3%
Total	39	100%

Table 4 Data on the Amount of Antidiabetic Use

Therapy Fees	Average Cost	
	Metformin 500 mg	Acarbose 100mg
Cost of Antidiabetic Therapy	Rp 22,674	Rp 168,077
Cost of Concomitant Illnesses	Rp 100.502	Rp 142,381
Consulting fee	Rp 30,000	Rp 30,000
Laboratory fee	Rp 266,385	Rp 340,464
Total cost of therapy	Rp 419,560	Rp 680,922

Cost Minimization Analysis

Based on table 4, it can be seen that the average value of direct medical costs, namely the cost of oral anti-diabetic therapy for metformin 500 mg, obtained an average value of Rp 22,674, at the cost of comorbidities of Rp 100,502, consulting fee Rp 30,000 lab fee Rp 266,385 so that the total average of 500 mg of metformin is Rp 419,560 while for acarbose 100 mg is Rp 168,077, at the cost of comorbidities, namely Rp 142,381, consultation fee Rp 30,000, laboratory fees Rp 680,000, so the average total cost for 100 mg of acarbose is Rp 680,922.

Discussion

This research was conducted at the Sultan Suriansyah Regional General Hospital, Banjarmasin. Patients who were sampled in this study were patients who had medical records with a diagnosis of Type II Diabetes Mellitus without complications in adult patients. The purpose of this study was to see the minimal value of using oral antidiabetic drugs in type 2 diabetes mellitus patients treated with metformin 500 mg or acarbose 100 mg.

Patient Characteristics

The prevalence of diabetes mellitus sufferers every year will always increase where as much as 90% of all cases of diabetes mellitus are more likely to be suffered by women compared to male patients where the risk factors for diabetes are caused by lifestyle such as excessive calories, lack of exercise and obesity.[6] Based table 1 above, it can be seen that the percentage of diabetics is more common in women than men which is caused by the difference in physical activity that men do more than women so that the process of glucose uptake in women's bodies is less than men who do can trigger hyperglycemia.[7] Another factor that triggers hyperglycemia in women is due to a decrease in the hormone estrogen which often occurs in old age so that the process of binding insulin also decreases.[8] Based on the age of diabetics in table 2, this study shows that patients with a diagnosis of diabetes mellitus are more experienced by

patients aged 36 to 45 years. according to Dipiro and ADA's statement that diabetes sufferers are more common at the age of over 40 years.[7,10]

Outcome of Oral Antidiabetics

The selection of antidiabetics used in this study was based on the equivalence value of the two drugs. This is because one of the requirements of cost-minimizing analysis research is that both interventions have equivalent clinical outcomes. based on research by Shuyan Gu et al (2015) it was found that from the glucose reduction value of metformin with acarbose it can be seen that metformin can lower HbA1c levels by 0.06% more than acarbose, but this difference is not significant with a probability value of 0.66 or >0.05 which means effectiveness of the two drugs are equivalent.[9] So from this statement, the drugs used in this study were metformin 500 g and acarbose 100 mg. Based on the research that has been done, it was found that the use of 500 mg metformin was more than 100 mg acarbose, namely 26 patients (66.7%) used 500 mg metformin therapy and 13 patients (33.3%) used 100 mg acarbose.

Cost Minimization Analysis

Based on table 4 above, it can be seen that the average of the total medical costs of the patients from the two therapies received by the patients, namely for metformin 500 mg, showed a total direct cost of Rp. 419,560 while for patients with 100 mg acarbose therapy it was Rp. 680,922. The total costs that include during treatment such as the cost of oral antidiabetic therapy, the cost of co-morbidities, consultation fees, and laboratory fees also show that metformin therapy is minimal compared to acarbose therapy except for the same consultation fees on the two drugs, this is due to the cost Consultation is already a fixed fee set by the hospital. Based on these results it can be concluded that the cost that is more minimal between the two therapies is to use metformin 500 mg therapy.

Statistical Test

Statistical tests were carried out to see the differences between the two drug groups, namely metformin and acarbose. The tests carried out in this study were the Mann Whitney test and the Independent T-Test. The Mann Whitney test was carried out for data that was not normally distributed, namely the cost of oral antidiabetic drugs, the cost of comorbidities, and laboratory costs where the probability values obtained sequentially were 0.005, 0.084, and 0.035, the meaning of these results is the cost of antidiabetic drugs and costs laboratories with a probability value of <0.05 is a significant difference between the two drugs, while at the cost of co-morbidities with a probability value of >0.05 there is no significant difference between the two drugs. Another statistical test that was carried out was the Independent T-Test where this test was carried out at the total cost of therapy because the results of the data normality test obtained normal data. The probability value of the independent T-Test on the total cost of therapy is 0.007 or <0.05 indicating that there is a significant difference between the two drugs. From the two statistical tests, it can be concluded that there is a significant difference between the two drugs, namely metformin 500 mg and acarbose 100 mg.

Conclusions

Based on research conducted on Type II Diabetes Mellitus patients at the Sultan Suriansyah Hospital in Banjarmasin for the January-December 2022 period, it can be concluded that the average size of the total medical costs incurred by Type II Diabetes Mellitus patients, namely metformin therapy, is Rp. 419,560 while therapy with acarbose is Rp. 680,922. Oral antidiabetic therapy that

has the least cost for diabetes mellitus patients is metformin compared to acarbose.

Pharmacoeconomic research that can be carried out further is to use other methods such as Cost Effectiveness Analysis (CEA), Cost Benefit Analysis (CBA), and Cost Utility Analysis (CUA) the cost of using oral antidiabetic drugs.

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