

# Correlation Between the Incidence of Drug-Related Problems (DRPs) and Clinical Outcomes in Type 2 Diabetes Mellitus Patients with Dyslipidemia at Central Hospital Dr. M. Djamil

Fitri Rachmaini, Yelly Oktavia Sari\*, Yori Yuliandra, Dini Wariska

Faculty of Pharmacy, Universitas Andalas, Padang, 25163, Indonesia

\*Corresponding author. Email: [yellyoktavia@phar.unand.ac.id](mailto:yellyoktavia@phar.unand.ac.id)

## ABSTRACT

Effective management of diabetes therapy is a major challenge in the management of chronic conditions that are accompanied by comorbidities like dyslipidemia. The potential of unwanted events or Drug-Related Problems (DRPs) increases the emergence of comorbidities. This study aims to identify the correlation between the incidence of DRPs and clinical outcomes in patients with type 2 diabetes mellitus with dyslipidemia at Central Hospital Dr. M. Djamil Padang. The study was conducted by prospective method that used purposive sampling technique with 25 inpatients. Identification of DRPs used Pharmaceutical Care Network Europe (PCNE) version 8.01. Inclusion criterias were type 2 diabetes mellitus patient with dyslipidemia and also patients were prescribed at least one of antidiabetic or anti dyslipidemia drug. The results showed that there were several types of DRPs consist of inappropriate drug combinations (32%), untreated indications (20%), inappropriate timing and/or dosing intervals (12%), and too short duration (8 %). Statistical analysis showed that there was not significant correlation ( $p>0.05$ ) between the incidence of DRPs and clinical outcomes in type 2 diabetes mellitus patients with dyslipidemia at Central Hospital Dr. M. Djamil Padang

**Keywords:** type 2 diabetes mellitus, dyslipidemia, Drug-Related Problems, antidiabetic drug, anti dyslipidemia drug

## 1. INTRODUCTION

Diabetes mellitus (DM) is a chronic condition that is characterized by an increase of blood glucose levels which is caused by a decrease of insulin secretion or insulin receptor sensitivity, or combination of both [1]. American Diabetes Association (ADA) classifies diabetes mellitus into four types consist of type 1 DM, type 2 DM, gestational DM, and other types of DM. Type 2 DM is the most common type compared to other types. There are 90% of the total population of patients with type DM [2]. If diabetes is not treated properly, complications can be life threatening.

Cardiovascular disease is the most common complication of DM. Dyslipidemia is a common comorbidity in type 2 DM patient. Based on the Centers for Disease Control and

Prevention (CDC), there was 70% to 97% of adults with type 2 DM have one or more lipid disorders. In type 2 DM patients, dyslipidemia is characterized by high triglyceride (TG) levels, decreased High Density Lipoprotein (HDL) cholesterol, and increased Low Density Lipoprotein (LDL) cholesterol [3]. Dyslipidemia therapy should be managed by individual consideration. Statin is the most widely used therapeutic option in diabetes mellitus patient with dyslipidemia. However, it often requires additional anti dyslipidemia to achieve the therapeutic goals [4]. Meta-analysis showed that there was correlation between statin and worsening glycemic control which is influenced by several factors consisting of lipophilic or hydrophilic, dose, and duration of LDL cholesterol reduction, age and clinical manifestations of the population. For the moderate to high risk group patient, statin reduce the risk of cardiovascular events but it causes an increase of developing diabetes risk [5].

Pharmaceutical Care Network Europe (PCNE) classifies Drug-Related Problems (DRPs) into several criterias consist of inappropriate indications, drugs without indications, drugs administration inappropriate, drug interactions, over or subtherapy doses, adverse drug reactions, and failure to receive drugs. The incidence of DRPs can delay the patient to gain clinical outcome. The previous study showed that the most common types of DRPs were drug-drug interactions (18.0%), not taking drugs (14.3%), and inadequate awareness of health and disease (11.8%) [3].

In pharmaceutical care, Pharmacist must ensure the patients to receive appropriate, efficient, and safe of drug therapy. These involve three functions consist of DRPs potential identification, solving or overcoming potential DRPs, and preventing potential DRPs [6]. This study aims to identify the correlation between the incidence of DRPs and clinical outcomes in patients with type 2 diabetes mellitus with dyslipidemia at Central Hospital Dr. M. Djamil Padang.

## **2. METHODS**

### **2.1. Time and place of research**

The research was carried out for three months during from June-August 2020 at Central Hospital DR. M. Djamil, Padang.

### **2.2. Research method**

The research was prospectively conducted by non-experimental descriptive method. Sampling was carried out by purposive sampling technique.

### **2.3. Data source**

Sources of data were collected from medical records of type 2 diabetes mellitus patients with dyslipidemia at Central Hospital Dr. M. Djamil, Padang.

### **2.4. Research Procedure**

#### **2.4.1 Determination of Sample Criteria**

##### **2.4.1.1 . Inclusion Criteria**

Inclusion criterias were type 2 diabetes mellitus patient with dyslipidemia and also patients were prescribed at

least one combination of antidiabetic and anti dyslipidemia drug.

##### **2.4.1.2. Exclusion Criteria**

Patients were incomplete medical record data.

#### **2.4.2 Data Collection**

Data retrieval used patients medical records that include prescription and completeness of patient data :

- a. Gender
- b. Age
- c. Occupation
- d. Education
- e. duration of DM
- f. length of stay
- g. diagnosis, list of drug administration
- h. results of laboratory tests

The data was transferred to the sheet that had been prepared.

#### **2.4.3 Data Analysis**

The research data was processed by Chi-square test method statistically using SPSS 21 to analyst the correlation between the types of DRPs and clinical outcomes.

## **3. RESULTS AND DISCUSSION**

This study has been conducted prospectively in type 2 diabetes mellitus patients with dyslipidemia at Central Hospital Dr. M. Djamil Padang from June to August 2020. The demographic characteristics of the patients included gender, age, occupation, and education that can be seen in Table 1. These result are in line with a type B hospital in Surabaya that showed the percentage of diabetes mellitus patients with dyslipidemia was more common in women (63%) than men (37%) [7]. Generally, human experiences a decrease of physiological function over the age of 40 years. A person aged over 45 years has an increased risk of developing diabetes and glucose intolerance due to degenerative factors, particularly the ability of cells to produce insulin for glucose metabolism [8]. The level of education influence behavior and many changes, especially knowledge of health. The awareness of healthy life is in line with education level [9].

**Table 1.** Demographic characteristics of type 2 diabetes mellitus patients with dyslipidemia

Categories	Number of patients	(%)
<b>Gender</b>		
Male	9	36%
Female	16	64%
<b>Total</b>	<b>25</b>	<b>100%</b>
<b>Age (year)</b>		
Less than 45	5	20%
45 to 65	13	52%
More than 65	7	28%
<b>Total</b>	<b>25</b>	<b>100%</b>
<b>Occupation</b>		
Work	10	40%
Does not work	15	60%
<b>Total</b>	<b>25</b>	<b>100%</b>
<b>Education</b>		
Elementary school	9	36%
Junir high school	1	4%
Senior high school	10	40%
Academy/Bachelor	5	20%
<b>Total</b>	<b>25</b>	<b>100%</b>

The clinical characteristics of the patients consist of the length of suffering of DM, the length of stay in the hospital, and the condition of returned home that can be seen in Table 2. There were patients who suffering type 2 DM more than 10 years with thirty two percent of patients. The risk of cardiovascular disorders will increase along with the longer a person has diabetes. Therefore, it needs to pay attention of several factors that can worsen the situation such as smoking, blood pressure, lipid profile, and body weight [10]. Previous study has shown that length of stay in the hospital has relationship with the incidence of DRPs. The number of drugs prescribed will increase due to the longer of the treatment. This conditions can potentiate an increased risk of developing DRPs [11].

**Table 2.** Clinical characteristics of type 2 diabetes mellitus patients with dyslipidemia

Categories	Number of patients	(%)
<b>Length of suffering</b>		
Less than 10 years	17	68%
More than 10 years	8	32%
<b>Total</b>	<b>25</b>	<b>100%</b>
<b>Length of stay</b>		
Less than 4 dias	1	4%
4 to 7 days	10	40%
8 to 14 days	9	36%
More than 14 days	5	20%
<b>Total</b>	<b>25</b>	<b>100%</b>
<b>Clinical outcome</b>		
Achieved	7	28%
Not achieved	18	17%
<b>Total</b>	<b>25</b>	<b>100%</b>

Pattern of antidiabetic drugs that the most widely prescribed in this study were combination of two insulins (Apidra and Lantus insulin) with 32 percent. Lantus insulin was the most widely insulin therapy with 16% of single insulin therapy. Whereas, there was four percent of combination of oral hypoglycemic drugs (OHD) and it is the least prescribed therapy in this study that can be seen in Table 3. The principle of the combination of prandial insulin and basal insulin is an effort to manage diabetes mellitus. Basal insulin is the amount of exogenous insulin per unit time that is required to prevent fasting hyperglycemia due to gluconeogenesis and also prevent undetected ketogenesis. Meanwhile, prandial insulin is the amount of insulin that is needed to convert food ingredients into a form of reserve energy so that postprandial hyperglycemia does not occur.

**Table 3.** Pattern of antidiabetic drugs in type 2 diabetes mellitus patients with dyslipidemia

No	Use of drugs	Antidiabetic drugs	Total	
			Number of patients	%
1	Two combinations of antidiabetic oral	Metformin + glibenklamid	1	4%
2	Single insulin	Levemir	2	8%
		Lantus	4	16%
		Apidra	1	4%
		Novorapid	1	4%
3	Two combinations of insulin	Apidra + Lantus	8	32%
		Novorapid + Levemir	6	24%
		Novorapid + Lantus	2	8%
<b>Total</b>			<b>25</b>	<b>100%</b>

Pattern of anti dyslipidemia drugs that the most widely prescribed in this study was Simvastatin with 82%. It can be seen in Table 4. If the patient's lipid profile cannot be corrected after administration of simvastatin or the patient has a history of serious cardiovascular disorders so that atorvastatin will prescribe.

**Table 4.** Pattern of anti dyslipidemia drugs in type 2 diabetes mellitus patients with dyslipidemia

No	Anti dyslipidemia drugs	Number of patients	%
1	Simvastatin	9	82%
2	Atorvastatin	2	18%

DRPs analysis aims to ensure safe, effective, and efficient of drugs. DRPs consist of several categories including drug selection, drug dosage form, dose selection, duration of therapy, dispensing, drug use processes [12]. Incidents of Drug Related Problems can be seen in Table 5. Based on this research, the most common types of DRPs is improper drug combination with 32%. This is in line with a previous research on type 2 diabetes mellitus patients at a hospital in Malaysia that the potential of drug interaction is the most common type of DRPs with 18% [3].

**Table 5.** Incidents of Drug Related Problems

Criteria of DRPs	Percentage of cases
<b>1. Drug selection</b>	
1.a. Improper drug combination	32%
1.b. Untreated indication	20%
<b>2. Duration of therapy</b>	
2.a. Too short duration	8%
<b>3. Drug use process</b>	
3.a. Inappropriate timing and/or dosing interval	12%

The results of statistical tests using the Chi square test showed that there was not significant relationship ( $p>0.05$ ) between demographic characteristics and clinical characteristics on discharge conditions in Type 2 DM patients with dyslipidemia. In addition, there was not significant relationship ( $p>0.05$ ) between the incidence of DRPs and clinical outcomes in Type 2 DM patients with dyslipidemia. It can be seen in Table 6 and Table 7.

**Table 6.** The value of correlation between demographic characteristics and clinical outcomes

No	Characteristics	Clinical outcome		P* value
		Achieved	Not achieved	
1	Gender			0.170 <sup>a</sup>
	Male	4	5	
	Female	3	13	
2	Age			0.302 <sup>a</sup>
	Adults	4	14	
	Elderly	3	4	
3	Occupation			0.275 <sup>a</sup>
	Work	4	6	
	Does not work	3	12	
4	Education			0.856 <sup>a</sup>
	Basic	3	7	
	Advanced	4	11	
5	Length of suffering of DM (year)			0.468 <sup>a</sup>
	Less than ten	4	13	
	More than ten	3	5	

6	Length of stay at hospital (day)			0.170 <sup>a</sup>
	Less than seven	4	5	
	More than seven	3	13	

<sup>a</sup> Chi Square Test

**Table 7.** The value of the correlation between DRPs characteristics and clinical outcomes

DRPs	Clinical outcome		P value
	Achieved	Not achieved	
Yes	3	9	0,748 <sup>a</sup>
None	4	9	

#### 4. CONCLUSION

The results of this study indicate that there was not significant relationship between demographic characteristics and clinical conditions when the patient returns home. In addition, there was not significant relationship between the incidence of DRPs and clinical outcomes in patients with Type 2 DM with dyslipidemia.

#### REFERENCES

- [1] De Fronzo RA, International Textbook of Diabetes Mellitus, Fourth, United Kingdom: Wiley Blackwell, 2015.
- [2]. Holman N, Young B, Gadsby R, Current Prevalence of Type 1 and Type 2 Diabetes in Adults and Children in the UK, Diabet Med, 32(9) (2015) 1119–20.
- [3]. Zaman H, Chai L, Drug-Related Problems in Type 2 Diabetes Mellitus Patients with Dyslipidemia, BMC Public Health, (13) (2013) 1192
- [4]. Mooradian AD, Dyslipidemia in type 2 diabetes mellitus, Nat Clin Pract Endocrinol Metab, 5(3) (2009) 150–9.
- [5]. Luman A, Statin-Induced Diabetes, Cermin Dunia Kedokteran, 41(4) (2014) 250–2.
- [6]. Cipolle RJ, Strand LM, Morley PC, Pharmaceutical Care Practice: The Clinician’s Guide. 2nd ed, New York: McGraw-Hill Company, 2004.
- [7]. Lie P, Pencegahan Penyakit Kardiovaskular pada Pasien Diabetes Melitus Rawat Jalan: Fokus pada Penggunaan Antiplatelet, Statin dan

- Antihipertensi yang Belum Rasional, *J Farm Klin Indonesia*, 5(3) (2016) 169–83.
- [8]. Betteng R, Analisis Faktor Resiko. Penyebab Terjadinya Diabetes Melitus Tipe 2 pada Waktu Usia Produktif di Puskesmas Wawonasa, *J e-Biomedik*, 2(2) (2014) 405–13.
- [9]. Wardani A, Isfandiari MA, Hubungan Dukungan Keluarga dan Pengendalian Kadar Gula Darah Dengan Gejala Komplikasi Mikrovaskuler, *J Berk Epidemiol*, 2(1) (2014) 1–12.
- [10]. Huo X, Risk of Non-Fatal Cardiovascular Diseases in Early-Onset Versus Late-Onset Type 2 Diabetes in China: a Cross-Sectional Study, *Lancet Diabetes Endocrinol*, 4(11) (2016) 115–24.
- [11]. Wincent MM, Assessment of Drug related Problems in Patients with Chronic Disease in the General Medicine Units of Tertiary Care Hospital, *Int J Pharm Pharm Sci*, 9(12) (2017) 194–200.
- [12]. Pharmaceutical Care Network Europe, Classification for Drug related problems, Vol. V 8.01, 'The PCNE Classification V 8.01.' Pharmaceutical Care Network Europe, 2017.