

Conference Paper

Impact of Adherence on Treatment Outcomes in Diabetic Patients

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Abstract.

Diabetes mellitus is still a burden in Indonesia. Failure of treatment may cause the worsening of this disease. This study aimed to define the association between patient adherence and treatment outcomes. We used a cross-sectional design with data from a public hospital in Java. We collected the patients' characteristics, medical treatments and treatment outcomes from their medical records. The inclusion criteria were adult diabetes mellitus patients without any comorbidities or complications and using antidiabetic medicine (oral and/or injection). The patients' adherence was assessed using the MARS questionnaire. We recruited 167 subjects from the hospital. Most of the subjects were male (60.0%), the average age was 60.47 (SD: 10.80), 43.7% had single treatment and 50.3% did not adhere. 58.7% subjects had uncontrolled fasting blood glucose (FBG) and 86.6% subjects had uncontrolled HbA1C. After adjusting for subjects' characteristics, there was a significant association between FBG and adherence. Adherence may increase FBG by as much as 1.95 times (95% CI: 1.04-3.65). We also found a significant association between adherence and the treatment outcome. Thus, we recommend that health care for diabetes mellitus patients must be complemented with education to increase adherence and improve outcomes.

Keywords: diabetes, adherence, treatment outcomes

1. Introduction

Diabetes still became the largest global health emergency in 21st century. Around 76.6% among people with diabetes, are with glucose intolerance, meaning that the risk for developing the diseases is getting higher [1]. The results of basic health survey conducted in Indonesia in 2007, 2013 and 2018 show the significant increase of diabetes prevalence [2]. The type 2 of Diabetes mellitus (T2DM) is more prevalent than other types of diabetes and in the high income countries its prevalence reach more than 90%, goes along with the changes of cultural and social relationship [1]. The Indonesia government has a good commitment that all diabetes patients may get complete treatment in primary health care. The services provided by the government to diabetic patients include the monitoring of blood glucose, pharmacologic treatment and education [2].

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Published 15 September 2022

Publishing services provided by Knowledge E

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Selection and Peer-review under the responsibility of the ICMEDH Conference Committee.

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A review about education to the diabetic inpatient states that some models for delivering the education skills for diabetic patients can be diabetes-specialty models, diabetes non-specialty care models and technology-supported diabetes education [3]. However, a study conducted in Palestine found that T2DM patients need to be educated using particular designed of interventions to increase their knowledge [4]. A systematic review and meta-analysis also presented that patients' education may improve the medication adherence by changing the health literacy. Thus, providing education to the individual may increase the patient's adherence and decrease the disease exacerbation and chronic disease relapse [5].

This study is aimed to determine the association between patients' adherence and treatment outcome in T2DM patients.

2. Methods

We used cross-sectional design. The inclusion criteria were adult T2DM patients and using pharmacologic treatment. Pregnant T2DM or pregnant patients were excluded. This study was conducted in public hospital in Java on September 2019. This study has been approved by Ethical Committee of Universitas Ahmad Dahlan No: 011914040.

We measured subjects' adherence using Medication Adherence Rating Scale (MARS) questionnaire, with the total score of 25 was categorized as comply and below 24 was categorized as not comply. The characteristics, pharmacologic treatment and treatment outcomes such as Fasting Blood Glucose (FBG) and glycated hemoglobine (HbA1C) were taken from the patients' medical records.

3. Results and Discussion

We recruited 167 subjects, with most of the subjects are female (60%), graduated from under Senior High School (68.3%), married (76.6%), have income lower than 250.000 IDR and use single pharmacologic treatment (43.7%). The proportion of adherence, uncontrolled FBG and uncontrolled HbA1C are 50.3%, 58.7% and 85.6%, respectively. Table 1 performs the subjects characteristics based on the adherence category. There are no significant differences of subject characteristics between the comply and non-comply subjects.

In general, our study finds that most of the T2M patients are not comply and the treatment outcome are uncontrollable. Our study also defines that the patients' characteristics did not influence the adherence. In contrast, a previous study stated that

male patients, older age, higher education and higher income have better adherence. The adherence also had association with morbidity and the number of medication [6]. Male patients, older patients, living in urban area, higher secondary education and businessman also predicted the patients' adherence [7]. Other previous study defined that non-adherence in T2DM patients were associated with illiteracy, change to other mode of treatments, poor diabetes knowledge and the number of medications. Non-adherence also may cause poor treatment outcomes and poor dietary adherence [8]. The type of antidiabetic also influences the patients' adherence, may be due to the side effect. T2DM patients with sulfonylurea and thiazolidinedions had lower adherence than the dipeptidyl peptidase-4 (DPP-4) inhibitors. Patients also more consider to stop the use of glucagon-like peptide-1 (FLP-1) receptor agonists than long-acting analogue insulin [9]. Some techniques can be applied to increase patients' adherence. Pill counting is one of the methods that can increase T2DM patients' adherence. However, the number of medications and comorbidities may influence the adherence [10]. Particular smart-mobile application also has potential to increase patients adherences, such as SAM (Smart about Meds) [11].

Table 2 depicts the association between the adherence and FBG. The adherence may increase the better FBG as 1.95 times (p value: 0.035; 95% CI: 1.04-3.65). Table 3 shows the association between the adherence and HbA1C. There is no significant association between them.

Many programs for T2DM patients, such as; patients education, health promotion and self-monitoring blood glucose, have objective to increase the patients' adherence and then will improve the glycemic control and prevent the diabetes complications [8]. Particular tool may facilitate the adherence to chronic disease management. Some of the studies in the systematic reviews showed that better outcome could be achieved by manage the patients' adherence [12]. Counselling and re-education for insulin injection can be provided to the T2DM patients to increase their adherence and improving the HbA1C [13]. The other systematic review and meta-analysis also stated that psychological intervention may be provided to the T2DM patients to improve patients' adherence and to lower HbA1C, beside telecare and educational interventions [14]. Finding the association between adherence measurement and Hb A1C could be shown in a previous review, that most of the studies showed significant association, even though it was depending on the range of the HbA1C values. Our study finding is in line with the review, which also stated that the association cannot be found in the low-income countries [15]. Other alternative to increase the adherence and improve the better outcome are by simplified the pharmacologic treatment. The combination

TABLE 1: Subjects characteristics based on the adherence category.

Characteristics	Comply (n=83,49.7%)	Not comply (n=84,50.3%)	Total subjects (n=167)	P
Age yo, Mean (SD)	61.05 (9.38)	59.91 (12.0)	60.47 (10.80)	0.495
Sex, n %				0.926
Male	50 (60.2)	49 (58.3)	99 (60)	
Female	33 (39.8)	35 (41.7)	68 (40)	
Education, n %				0.326
Under Senior High School	61 (73.5)	53 (63.1)	114 (68.3)	
Senior High School	12 (14.5)	13 (15.5)	25 (14.9)	
Diploma 1/ 2/ 3	1 (1.2)	6 (7.1)	7 (4.2)	
Above Diploma	9 (10.8)	12 (14.3)	21 (12.6)	
Marital Status, n %				0.361
Married	66 (79.5)	62 (73.8)	128 (76.6)	
Not Married	15 (20.5)	22 (26.2)	39 (23.4)	
Income in IDR, n %				0.506
< 250.000	26 (31.3)	31 (36.9)	57 (34.1)	
250.000-1.000.000	17 (20.5)	10 (11.9)	27 (16.2)	
1.000.000-3.000.000	21 (25.3)	28 (33.3)	49 (29.3)	
>3.000.000-5.000.000	19 (22.9)	15 (17.9)	34 (20.3)	
Work, n %				0.839
Entrepreneur	52 (62.6)	51 (60.6)	103 (61.7)	
Midwife	24 (28.9)	28 (33.3)	52 (31.1)	
Teacher	2 (2.4)	2 (2.4)	4 (2.4)	
Government employee	5 (6.0)	2 (2.4)	7 (4.2)	
Students	0 (0)	1 (1.2)	1 (0.6)	
Pharmacologic treatment, n %				0.192
Single	35 (42.2)	38 (45.2)	73 (43.7)	
Oral combination	32 (38.5)	38 (45.2)	70 (41.9)	
Oral-insulin	16 (19.3)	8 (9.6)	24 (14.4)	

between oral antidiabetic and insulin showed the higher adherence than the bolus basal insulin. Other parameters such as, weight, quality of life and risk of hypoglycemia was also improved due to the simple treatment [16].

Our study results consider that the T2DM patients have poor adherence and uncontrol treatment outcomes. We suggested that more interventions needed to increase the adherence and improve the treatment outcome, because the subjects' characteristics did not predict the adherence. Some variables are needed for the future study, such as

TABLE 2: Association between adherence and FBG.

Adherence	FBG N (%)		P value	OR (CI 95%)
	Controlled	Uncontrolled		
Comply	41 (49.4%)	42 (50.6%)	0.035	1.95 (1.04-3.65)
Non-comply	28 (33.3%)	56 (66.7%)		
Total	69 (41.3%)	98 (58.7%)		

TABLE 3: Association between adherence and HbA1C.

Adherence	HbA1C, N (%)		P value	OR (CI 95%)
	Controlled	Uncontrolled		
Comply	11 (13.3%)	72 (86.7%)	0.682	0.83 (0.35-1.99)
Non comply	13 (15.5%)	71 (84.5%)		
Total	24 (14.4%)	143 (85.6%)		

lifestyle, distress and environment situation to assess the association between patients' adherence and treatment outcomes.

4. Conclusion

We find significant association between adherence and the treatment outcome. The health care must be completed with education and other interventions for Diabetes mellitus patients to increase their adherence and to get the better outcome.

acknowledgement

The authors thank to Head and staffs of public hospital in Java

Conflict of Interest

The authors have no conflict of interests

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