

# The Relationship Between Knowledge and Medication Adherence in Diabetes Mellitus Patients in Toboali Hospital, South Bangka Selatan

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## ABSTRACT

Diabetes mellitus is the fourth leading cause of death globally, after cardiovascular disease, cancer, and chronic respiratory disease. Proper anti-diabetic medication will reduce the high morbidity and mortality rate of diabetes mellitus. Medication adherence is an essential determinant of therapeutic success in patients with diabetes in preventing complications and achieving therapeutic targets. The higher the knowledge about diabetes mellitus, the higher the level of medication adherence. This study aimed to determine the relationship between knowledge and medication adherence in patients with diabetes mellitus. An observational analytical study with a cross-sectional design was conducted on 102 respondents in Toboali Hospital, South Bangka Regency, in 2021. A consecutive sample was used as a sampling method that involved distributing the study questionnaire to diabetes patients that fulfill the inclusion criteria. To measure the association between knowledge and medication adherence using the chi-square test. Out of the 102 respondents, as many as 71.6% respondents have a low level of adherence, and 28.4% are compliant. The majority of respondents have a good level of knowledge (46.0%). There was a positive correlation between knowledge and medication adherence in patients with diabetes mellitus in Toboali Hospital, South Bangka Regency (p-value = 0.04).

**Keywords:** *Diabetes Mellitus, Knowledge, Medication Adherence.*

## 1. INTRODUCTION

About 80% of deaths from non-communicable diseases occur in low- and middle-income countries [1]. The International Diabetes Federation (IDF) shows that the prevalence of the world's population of diabetes mellitus continues to increase, from 463 million in 2019 it is predicted to reach 578 million by 2030 [2]. Southeast Asia and the Western Pacific have the most considerable prevalence, accounting for half of diabetes mellitus cases worldwide [1]. The prevalence of diabetes mellitus in Southeast Asia reached 88 million cases in 2019, which is predicted to continue to increase to 115 million cases by 2030 [2]. Indonesia is among the countries with the highest prevalence of diabetes mellitus, which is 4th. Based on the Basic Health Research (Riskesmas) results in 2018, the prevalence of diabetes mellitus in Indonesia reached 2.0%. The highest prevalence of diabetes mellitus based on diagnosis by a doctor, in 2018 there

was in DKI Jakarta reached 3.4%, and the lowest prevalence in NTT was 0.8%. Bangka Belitung Province ranks 6th province with the highest prevalence of diabetes mellitus going 2.5% of the population [1].

Diabetes mellitus requires lifelong treatment [3]. Non-adherence to medication is one of the serious problems in diabetes mellitus patients' management. Patients with a history of uncontrolled diseases often visit health facilities with poor conditions due to various complications such as ketoacidosis or chronic renal failure [4]. Research at Sukoharjo Surakarta Hospital shows that most people with diabetes mellitus have low drug adherence (41.7%) [5]. Similar finding was found at Puskesmas Surabaya, which showed that 69% of diabetes patients do not comply with taking medicine [6]. Low adherence to taking medication was also found in research in Wangaipu, East Sumba, which showed that most (76%) diabetes patients do not comply in taking drugs [7]. Non-compliance in taking drugs can be due to

insufficient patient knowledge about diabetes mellitus, especially treatment regimens and their benefits [8].

A study at Sukoharjo Surakarta Hospital shows that most diabetes patients had moderate (38.9%) and low (37.5%) knowledge about diabetes [5]. Similarly, research in Wangaipu, East Sumba, shows that most diabetes patients had fair (32%) and low (36%) knowledge about diabetes [7]. Boyoh et al. (2011) found that most diabetes patients (62.1%) have relatively poor knowledge [8]. Therefore, this study aimed to determine the relationship between knowledge and medication adherence among diabetes mellitus patients in Toboali Hospital, South Bangka Regency, Bangka Belitung Islands.

## 2. RESEARCH METHODS

An observational analytics study with a cross-sectional study design was conducted on 102 respondents who were diabetes mellitus patients taking medication at Toboali Hospital, South Bangka Regency. Samples were taken by consecutive sampling techniques and used questionnaires as research instruments.

## 3. RESEARCH RESULTS

Of the 102 respondents, the majority of respondents were 46-55 years with female gender (55.9%). The majority of respondents were high school graduates (45.1%) with less than 1.5 million income per month and had been diagnosed with diabetes mellitus for 1 to 10 years, and most respondents took only one type of diabetes mellitus medication (72.5%). (Table 1)

**Table 1.** Characteristics of Respondents

Characteristic	Total (N=102)	Percentage (%)	Mean ( $\pm$ ) SD	Median (min-maks)
Age (years)			51.3 $\pm$ 10.97	51.5 (23-80)
16 – 25	1	1		
26 – 35	12	11.8		
36 – 45	20	19.6		
46 – 55	34	33.3		
56 – 65	27	26.5		
66 – 75	7	6.9		
76 – 85	1	1		
Gender				
Man	45	44.1		
Woman	57	55.9		
Education background				
Primary school	16	15.7		
Junior high school	21	20.6		
Senior high school	46	45.1		
Diploma/Bachelor/Master degree	19	18.6		
Occupation				
Not working	19	18.6		
Farmer	11	10.8		
Merchant	13	12.7		
Private	3	2.9		
Self employed	18	17.6		
Civil servants	16	15.7		
IRT	14	13.7		
Army/Police	7	6.9		
Other	1	1		
Income				
< 1.5 million rupiah	47	46.1		
1.5 – 2.5 million rupiah	22	21.6		
2.6 – 3.5 million rupiah	18	17.6		
> 3.5 million rupiah	15	14.7		
Period of diagnosis				
< 1 years	25	24.5		
1 – 10 years	77	75.5		
Number of diabetes drugs				
1 type of medicine	74	72.5		
2 type of medicine	26	25.5		
3 type of medicine	2	2.0		

**Table 2.** Knowledge of diabetes mellitus

Level of knowledge	Total (N=102)	Percentage (%)
Bad	27	26.5
Fair	28	27.5
Good	47	46.0

**Table 3.** Level of medication adherence in diabetes patients

Medication adherence	Total (N=102)	Percentage (%)
Non-compliant	73	71.6
Compliant	29	28.4

Table 2 shows that most of the respondents in this study, namely 47 people (46.0%), had good knowledge

about diabetes mellitus. Table 3 shows that only 29 people (28.4%) were classified as compliant.

The level of knowledge was assessed based on respondents' answers in a questionnaire consisting of 24 questions. Of the 24 questions asked, most respondents understood the basic understanding and some complications of diabetes mellitus and the impact that can occur if not handled properly. The majority of respondents had good knowledge of diabetes mellitus (46.0%). (Table 2)

Medication adherence to diabetes mellitus medication was assessed based on translated and modified Morisky Medication 8 item Adherence Scale (MMAS). The majority of respondents were categorized as non-compliant (71.6%). (Table 3)

**Table 4.** Diabetes Mellitus Knowledge Questionnaire

No.	Question	T* (%)	F** (%)	Answer
1.	Diabetes mellitus is an over-sugar disease in the blood.	80.4	19.6	T
2.	One of the causes of diabetes mellitus is due to the lack or absence of the hormone insulin.	70.6	29.4	T
3.	Diabetes mellitus causes kidney failure to hold sugar out through urine.	65.7	34.3	T
4.	The kidneys produce the hormone insulin.	43.1	56.9	F
5.	In the case of untreated diabetes mellitus, sugar levels in the blood usually increase.	84.3	15.7	T
6.	If I have diabetes mellitus, my children are more likely to develop diabetes mellitus.	67.6	32.4	T
7.	Diabetes mellitus can be cured.	57.8	42.2	T
8.	Fasting blood sugar levels of 210 mg/dl are too high.	72.5	27.5	T
9.	The best way to check for diabetes mellitus is to do a urine test.	37.3	62.7	F
10.	There are two types of diabetes mellitus: Type 1 (dependence on insulin) and Type 2 (resistance to insulin)	70.6	29.4	F
11.	Treatment is more important than diet and exercise to control diabetes mellitus.	52.0	48.0	F
12.	Diabetes mellitus often causes poor blood circulation.	76.5	23.5	T
13.	Wounds and abrasions in people with diabetes mellitus heal more slowly.	73.5	26.5	T
14.	People with diabetes mellitus should be more careful when cutting nails.	64.7	35.3	T
15.	How to prepare food for people with diabetes mellitus is as important as the type of food eaten.	66.7	33.3	T
16.	Diabetes mellitus can damage the kidneys.	57.8	42.2	T
17.	Diabetes mellitus can cause loss of feeling in the hands, fingers, and feet.	71.6	28.4	T
18.	Shaking and sweating are signs of having high blood sugar in the body.	39.2	60.8	F
19.	Frequent urination and thirst are signs of having low blood sugar in the body.	33.3	66.7	F
20.	The diet for people with diabetes mellitus consists mostly of special foods.	67.6	32.4	T
21.	Uncontrolled diabetes mellitus can cause vision impairments such as cataracts	61.8	38.2	T
22.	Diabetes mellitus medication should not be taken for life	52.0	48.0	F
23.	Sports such as swimming, cycling, morning walks are good sports for people with diabetes mellitus	69.6	30.4	T
24.	Wounds on the legs of patients with uncontrolled diabetes mellitus can deteriorate rapidly until they have to be amputated	75.5	24.5	T

**Table 5.** Medication Adherence Questionnaire

No.	Question	Y** (%)	N* (%)	Answer
1.	Have you ever forgotten to take antidiabetic drugs?	52.0	48.0	N
2.	For the last two weeks, have you ever not taken antidiabetic drugs?	61.8	38.2	N
3.	Have you ever stopped or reduced the use of the drug without telling the doctor because you feel the condition gets worse / uncomfortable when taking antidiabetic drugs?	62.7	37.3	N
4.	Have you ever forgotten to bring antidiabetic drugs while traveling or leaving home?	60.8	39.2	N
5.	Did you take antidiabetic drugs yesterday?	39.2	29.4	Y
6.	When you feel that things are getting better, have you ever chosen to stop taking antidiabetic drugs?	60.8	39.2	N
7.	Some people feel uncomfortable if you have to take medication every day, have you ever felt annoyed because you have to take antidiabetic drugs every day?	51	49	N

**Table 6.** The relationship between knowledge and medication adherence

Knowledge	Medication Adherence		Total (N=102)	P value	PR
	Compliant	Not-compliant			
Good	25 (61.8%)	50 (66.67%)	75	0.04	2.23
Bad	4 (14.8%)	23 (85.18 %)	27		

Table 6 shows that 23 people (85.18%) had a poor knowledge level also not compliant with taking antidiabetic drugs. Meanwhile, there are 50 people with good knowledge (66.67%) who were non-compliant. The number and percentage of compliant patients taking antidiabetic drugs tended to increase in the group of respondents with relatively good knowledge (PR=2.23).

#### 4. DISCUSSION

The majority of respondents had good knowledge about diabetes mellitus (46.0%). Of the 24 questions, there were five statements Respondents answered correctly which consisted of basic understanding and some complications of diabetes mellitus, as well as the impact that can occur if it is not handled properly that respondents mostly correctly selected. The educational background of respondents in this study is one of the factors that influence the result of the research. Most respondents were high school graduates. A higher educational background increases a person's opportunity to have advanced knowledge of diabetes mellitus, similarly with Nazriati et al.'s study, which stated that one's knowledge is influenced by education. Several other factors that can affect a person's level of knowledge include age, experience, and facilities of information media such as radio, television, newspapers, etc [9].

Although most of the respondents in this study had a good level of knowledge about diabetes mellitus, the total percentage can still be considered relatively low because more than 50% of respondents in this study did not have good knowledge about diabetes mellitus. The results differed from research in Sanglah Hospital, Bali. Most respondents know diabetes mellitus, which is classified as good (63.2%) [10]. In addition, the findings from the study at Puskesmas Mandau, Riau, showed a higher number who know about diabetes mellitus, which is classified as good (75%) [9]. Meanwhile, research in India shows results that are more or less similar to the findings in this study, where respondents have a good knowledge of diabetes mellitus (45%) [11].

These differences may be related to differences from various factors from this study with others. One of them is the education program conducted by local health workers individually or on public counseling. Other factors that can influence knowledge are information obtained from others (e.g., neighbors, co-workers), previous experience, education, age, and information facilities such as television, radio, newspapers, etc [9].

Most of the respondents in this study were not compliant with medication (71.6%). The high rate of non-adherence in taking diabetes mellitus drugs was supported by the findings of a study in India, which showed slightly lower results in which 54% of patients did not adhere to the diabetes mellitus treatment regimen [11]. And a study in Pakistan found only 40% of patients were non-compliant taking diabetes mellitus medication [12].

Some factors may result in the high medication non-adherence in this study, as obtained in a study in Pakistan where most non-compliant respondents were those in low socioeconomic status. This condition can reduce opportunities for a person to access proper treatment, either due to medical expenses or transportation costs. In addition, a burden to visit a health facility is indirectly related to reduced exposure to health care workers' education, resulting in insufficient knowledge and motivation of patients for treatment, which ultimately leads to low medication adherence in taking antidiabetic drugs [9][12].

Based on the results of studies, there is a significant relationship between knowledge of medication adherence among diabetes patients ( $p=0.04$ ). This result is similar to the Mandpe et al. study in India, which showed a significant correlation between knowledge and medication adherence in diabetes mellitus patients ( $p<0.01$ ) [11] and Nazriati et al. in Mandau, Riau ( $p<0.05$ ) [9]. Hameed et al. and Jasmine et al. found most patients who did not comply with medication had poor knowledge about the disease and treatment of diabetes mellitus [12][13]. In addition, Hameed et al. found patients who are not fully informed by health workers during treatment tend to be not compliant with medication [12].

#### 5. CONCLUSION

Most respondents (46.0%) had good knowledge of diabetes mellitus. The majority of respondents had low medication adherence in diabetes mellitus patients (71.6%). There is a statistically significant relationship between knowledge and medication adherence in diabetes patients ( $p=0.04$ ).

## 6. SUGGESTION

Health workers in health centers can motivate patients to increase medication adherence by conducting more materials in health education for diabetes patients. Further research should work with more analysis of causal factors.

## AUTHORS' CONTRIBUTIONS

US: Conception of the topic, collected literature and wrote the original manuscript. SG: Contributed to the review, editing, and supported in the supervision. All authors read and approved the final manuscript.

## ACKNOWLEDGMENTS

We would like to thank the research unit of Universitas Tarumanagara and Toboali Hospital Management for supporting this project.

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