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Factors that Influence the Level of Medication Adherence in Diabetes Mellitus Patients in Magelang City Hospital

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Abstract: The global prevalence of diabetes in 2019 is estimated at 9.3% increasing to 10.2% in 2030 and 10.9% in 2045. Medication adherence is still one of the problems of uncontrolled blood sugar in patients with diabetes mellitus. Non medication adherence of type 2 diabetes mellitus patients with treatment will have an impact on the expected clinical outcomes, the risk of complications, and poor quality of life. Therefore, this study aims to determine the level of medication adherence in diabetes mellitus patients and analyze the factors that influence it. This study is an observational analytical study with a cross-sectional design and was conducted at the Internal Medicine Polyclinic of Magelang City Hospital from December 2023 to January 2024. Respondents were taken as many as 65 people using a purposive random sampling technique. The sample of this study was diabetes mellitus patients who were taking antidiabetic drugs at the Internal Medicine Polyclinic of Magelang City Hospital. The research instrument was the Morisky Medication Adherence Scale 8-item (MMAS-8) questionnaire. Bivariate data analysis using chi-square test using SPSS. The effect is said to be significant if $p < 0.05$. The level of medication adherence of most DM patients at Magelang City Hospital is classified as moderate. This study shows that the number of drugs consumed in a day is the most significant factor ($p = 0.001$) on the level of medication adherence. While age, gender, occupation, and duration of DM did not affect the level of medication adherence.

Keywords: Medication adherence, diabetes mellitus

1. Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia that occurs due to abnormalities in insulin secretion, insulin action or both. The diagnosis of DM is made on the basis of checking blood glucose levels and HbA1C. Classic complaints include polyuria, polydipsia, polyphagia and unexplained weight loss. The aim of DM management is to eliminate DM complaints, improve quality of life and reduce acute complications. To achieve this goal, it is necessary to control blood glucose with pharmacological therapy, blood pressure, body weight and lipid profile, through comprehensive patient management (Soelistijo, 2021).

The global prevalence of diabetes in 2019 is estimated at 9.3% (463 million people), increasing to 10.2% (578 million) in 2030 and 10.9% (700 million) in 2045. This prevalence is higher in urban areas (10.8%) compared to rural areas. (7.2%) and in high-income countries (10.4%) compared to low-income countries (4.0%). One in two (50.1%) diabetes sufferers do not know that they have diabetes. The global prevalence of impaired glucose tolerance was estimated at 7.5% (374 million) in 2019 and is projected to reach 8.0% (454 million) in 2030 and 8.6% (548 million) in 2045 (Saeedi *et al.*, 2019).

Treatment adherence and low glycemic control are still problems in the majority of DM patients. Non medication adherence of type 2 diabetes mellitus (T2DM) patients with treatment will have an impact on expected clinical outcomes, risk of complications, and poor quality of life. Based on research (Army, 2023). shows that the results of statistical tests using Spearman rank show that there is a strong relationship between adherence to taking medication and blood sugar levels of 0.001 ($p<0.05$) and there is a sufficient relationship between lifestyle and blood sugar levels of 0.013 ($p<0.05$). Adherence with taking medication has a higher influence on blood sugar levels than lifestyle, but this does not mean that implementing a good lifestyle is not important.

Research by (Anshari *et al.,* 2023) shows a low adherence rate of 40.5% and high adherence of 59.5%. Patients with the highest HbA1C results were in the target category not achieved as much as 57.1% with a p value of 0.006, which means there is a relationship between adherence to taking antidiabetic medication and the HbA1c value. Apart from that, it can also be seen from the fasting blood glucose levels and when the patient still exceeds normal limits. Low adherence is caused by forgetting, not complying with treatment according to doctor's instructions, errors in reading labels, and too many medications so that patients find it difficult to follow. The number of medications affects the level of adherence, that is, if the number of medication items increases, the adherence score for type 2 DM patients will decrease.

Irregular blood glucose monitoring, no comorbidities, never having a general health check, sociodemographics and not having health insurance coverage are significantly associated with low awareness of diabetes treatment. The level of patient adherence in taking antidiabetic drugs in Magelang City is still unknown. Therefore, this study aims to determine the level of adherence of diabetes mellitus patients and analyze the factors that influence it.

2. Materials and Methods

This study is an analytical study observational with a cross sectional design and carried out at the Internal Medicine Clinic, Magelang City Regional Hospital from December 2023 to January 2024. The sample for this study is diabetes mellitus (DM) patients who are taking antidiabetic drugs at the Internal Medicine Clinic, Magelang Regional Hospital. Inclusion criteria in this study including: (1) DM patients who is registered at the RSUD Internal Medicine Polyclinic Magelang Regency, (2) DM patients who are taking antidiabetic drugs, (3) Want to participate as respondents and (4) The patient's age is more than the same with 20 years. Meanwhile, the exclusion criteria from this study are (1) Patients with dementia, (2) Patients who cannot be communicated with verbally.

There were 65 respondents taken with purposive random sampling technique. The research instrument is a questionnaire from Morisky Medication Adherence Scale 8-item (MMAS-8) (Andarmoyo *et al.,* 2019) to measure levels adherence in taking medication (reliability level 0.83). Apart from that, it is also used questionnaire containing sociodemographic data, the number of drugs taken and the duration of DM was also used. The level of adherence is said to be low if respondents had more MMAS-8 scores of 2, the level of adherence is moderate if

respondents had the same MMAS-8 score with 1 or 2, while the level of adherence high if the respondent has a score MMAS-8 is equal to 0. The dependent variable in this study is the level of medication adherence of DM patients. While the independent variables are age, gender, last education, employment status, duration of DM and the number of drugs taken in a day.

Bivariate data analysis using tests chisquare using SPSS. Effects were considered significant if $p < 0.05$. This study was approved by the Health Research Ethics Committee Tidar Regional General Hospital with Ethics Number 051/EC-RSUDTIDAR/XI/2023.

3. Results and Discussion

There were 65 respondents who entered this research. Table 1 shows that research respondents were dominated by patients aged ≥ 60 years. The majority of respondents are female. Most of the final education is a bachelor's degree. Most of it works. Most respondents had suffered from DM for >5 years and most took >2 medications a day. Adherence with taking medication is mostly still moderate.

Table 1. Distribution of Respondents' Demographic Characteristics

Variable	F	Percentage (%)
Age		
20-59 year	26	40
≥ 60 year	39	60
Gender		
Man	21	32.3
Women	44	67.7
Last education		
Elementary school	15	23.2
Middle school	9	13.8
High school	18	27.7
Bachelor’s degree	23	35.3
Employment status		
Doesn’t worker	51	78.5
Worker	14	21.5
Long suffering DM		
<5 year	34	52.3
≥5 year	31	47.7
Amount of medication taken		
0-2 medication	26	40.0
>2 medication	39	60.0
Level medication adherence		
Low	32	49.2
Medium	33	50.8

Adherence with taking medication for diabetes mellitus patients is important to be able to control the patient's blood sugar levels. There are many factors that can influence a patient's medication adherence, including internal factors within the patient or patient factors (demographic data, patient knowledge), treatment factors (length of drug use, number of drugs, history of drug side effects), external factors (family or environmental support). surroundings,

economy). In this study, we looked at the relationship between patient demographics and treatment factors with medication adherence in diabetes mellitus patients.

3.1 Relationship between Age and Adherence with Medication

Based on table 2, it shows that respondents aged 20-59 years as many as 14 respondents (53.85%) have moderate adherence. Meanwhile, in the age group above 60 years as many as 20 respondents (51.28%) have a low level of adherence. Based on the statistical test, a p value of 0.440 was obtained so that it can be concluded that there is no relationship between age and adherence with taking medication.

The results of this study are in line with research which states that age does not have a significant relationship with medication adherence in DM sufferers (Ningrum, 2020). The results of research also stated that age does not have a significant relationship with medication adherence in DM sufferers and patients aged 19-59 years are 0.19 times more compliant than patients aged more than 60 years (Akrom *et al.,* 2019). This is also similar to research (Hijriyati *et al.,* 2023) that age is not significantly related to the level of adherence because in the age range of 46-59 years they are still productive and may cause non- adherence with control and taking their medication. While the age of over 60 years also has many factors that may influence non-adherence in taking medication, one of which is the absence of a companion in taking medication and support from the family.

Table 2. Relationship between age and the level of medication adherence

Age	The level of medication adherence						p-value
	Medium		Low		Sum		
	F	%	F	%	F	%	
20-59 year	14	53.8	12	46.1	26	100	0.44
≥60 year	19	48.7	20	51.2	39	100	
Sum	33	50.7	32	49.2	65	100	

3.2 Relationship between Gender and Adherence with Medication

Based on table 3, it shows that the proportion of medication adherence with the highest level of adherence is women, namely 23 respondents (52.27%) and the proportion of low adherence is men, namely 11 respondents (52.38%). This is in accordance with research that gender is related to different life roles and behaviors between men and women in society. In maintaining health, women usually pay more attention to their own health so that they will be more obedient in taking medication compared to men. However, from the results of the statistical test, a p value of 0.466> 0.05 was obtained, so it was concluded that there was no relationship between gender and the level of medication adherence (Novian, 2013).

Table 3. Relationship between gender and adherence with medication

Gender	The level of medication adherence						p-value
	Medium		Low		Sum		
	F	%	F	%	F	%	
Man	10	47.62	11	52.38	21	100	0.466
Women	23	52.27	21	47.73	44	100	
Sum	33	50.77	32	49.23	65	100	

3.3 Relationship between employment status and medication adherence

Work is an activity carried out daily and has an important role in determining human quality. Work to limit the gap in health information and practices that motivate people to obtain information and act accordingly to avoid health problems (Notoatmojo, 2012) Cross-tabulation of the relationship between work and medication adherence can be seen in table 4. Based on table 4, it shows that the p value> 0.05 is obtained, it can be concluded that there is no relationship between employment status and medication adherence. This result is in line with research that there is no significant relationship between employment status and medication adherence in people with diabetes mellitus (Ningrum, 2020). In this study, more respondents who did not work were women who were housewives, who often neglected to take their medication.

Table 4. Relationship between employment status and medication adherence

Employment status	The level of medication adherence						p-value
	Medium		Low		Sum		
	F	%	F	%	F	%	
Worker	6	42.86	8	57.14	14	100	0.357
Doesn't work	27	52.94	24	47.06	51	100	
Sum	33	50.77	32	49.23	65	100	

3.4 Relationship between long suffering DM and Adherence to Medication

The duration of being diagnosed with diabetes mellitus was also examined to see whether it was related to the level of medication adherence or not. This can be seen in table 5 which shows that the p value> 0.05 is obtained, which means that it can be concluded that there is no relationship between the duration of suffering from DM and medication adherence. The results of this study are in accordance with Ningrum's research that there is no relationship between the duration of suffering from diabetes mellitus and medication adherence (Ningrum, 2020). In general, the level of adherence of newly diagnosed patients is high because patients are very compliant with the recommendations given, but the duration of diabetes does not greatly affect adherence. Patients who have been taking medication for a long time do not always have low adherence.

Table 5. Relationship between long suffering DM and Adherence to Medication

Long suffering DM	The level of medication adherence						p-value
	Medium		Low		Sum		
	F	%	F	%	F	%	
<5 year	18	52.94	16	47.06	34	100	0.453
≥5 year	15	48.39	16	51.61	31	100	
Sum	33	50.77	32	49.23	65	100	

3.5 Relationship between the number of medications taken in a day and adherence to medication

The medication adherence factor can also be seen from the relationship between the number of drugs taken in a day and medication adherence which can be seen in table 6. From the

results of the study, a p value of 0.032 was obtained (sig <0.05) so it can be concluded that there is a relationship between the number of drugs taken in a day and medication adherence. This is in line with research which states that there is a relationship between the number of drugs taken in a day and the level of medication adherence. Based on the interviews conducted, non- adherence with medication was caused by taking more than 2 drugs a day, respondents complained because they had to take >2 drugs a day because they had other diseases and sometimes caused side effects (Ningrum, 2020). This study also showed that respondents who received combination drug therapy said they sometimes forgot or got bored of taking medication, which increased non-adherence in taking medication.

Table 6. Relationship between the number of medications taken in a day and adherence to medication

The number of medication	The level of medication adherence						p-value
	Medium		**Low**		**Sum**		
	F	**%**	**F**	**%**	**F**	**%**	
0-2 medicine	20	76.92	6	23.08	26	100	0.001
>2 medicine	13	33.33	26	66.67	39	100	
Sum	33	50.77	32	49.23	65	100	

4. Conclusion

Level of adherence to treatment long-term oral antidiabetic in the majority of DM patients are in the Disease Polyclinic In the Magelang City Regional Hospital it is still moderate. This study shows that The amount of medication consumed in a day is factors that have the most influence on level of treatment adherence.

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Conflict of Interest

All Authors declare no conflict of interest and agree with the content of the manuscript.

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