Analysis of the self-adherence to treatment and blood glucose monitoring in patients with diabetes mellitus

Amanda Marselin[1], Fajar Agung Dwi Hartanto[1], Maria Putri Sari Utami[2]

1 Department of Pharmacy, STIKES Notokusumo Yogyakarta, Yogyakarta, Indonesia
2 Department of Nursing, STIKES Notokusumo Yogyakarta, Yogyakarta, Indonesia

Original Article

Abstract

BACKGROUND: Patients with diabetes mellitus (DM) are increasing every year around the world, but only about 30% are taking medication regularly. The main goal of therapy in patients with DM is to normalize insulin activity and blood glucose levels without hypoglycemia to reduce neuropathic complications. Patients with DM must control their blood glucose levels regularly so that the value of blood glucose levels and adherence to treatment which are the main factors in the outcome of therapy are identified. The purpose of this study was to analyze the adherence of patients with DM to medication and monitoring blood glucose levels as part of self-adherence.

METHODS: This research is an analytical survey research with a cross-sectional design. The research sites were 5 wound care clinics spread across the Province of the Special Region of Yogyakarta, Indonesia, with a period between March to June 2021. The sampling technique was the accidental sampling method based on predetermined inclusion criteria. Data collection was carried out using a questionnaire and data analysis was carried out using univariate and bivariate methods.

RESULTS: The patients who became respondents in this study were 26 people, 50% men and 50% women. 53.8% of patients adhered to monitoring blood glucose levels and 65.4% adhered to treatment. Compliance with monitoring blood glucose levels was associated with medication adherence (P = 0.018). Age had a relationship with blood glucose level monitoring compliance (P = 0.047) and medication adherence (P = 0.015).

CONCLUSION: There is a relationship between adherence to monitoring blood glucose levels with medication adherence. Age has a relationship with blood glucose level monitoring and medication adherence.

KEYWORDS: Diabetes Mellitus; Diabetic Ulcers; Blood Glucose

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Introduction

Diabetes mellitus (DM) is a metabolic disorder disease caused by a lack of insulin production or disturbances in insulin function, even though the amount is normal. This is due to damage to some or all of the cells of the pancreas gland (beta cells). Every year, the trend of the number of people with diabetes is increasing. Based on a survey conducted by the World Health Organization (WHO) in 2011, the number of people with DM in the world is 200 million people and Indonesia now ranks 4th with the largest number of people with DM in the world after India, China, and the United States (US). Of these, there are people with DM (50%) who are aware of having it and of them, only about 30% are taking regular medication.

The main goal of therapy in patients with DM is to normalize insulin activity and blood

Corresponding Author:
Maria Putri Sari Utami; Department of Nursing, STIKES Notokusumo Yogyakarta, Indonesia
Email: mariaputrisari88@gmail.com

glucose levels without hypoglycemia in an effort to reduce neuropathic complications. DM prevention can be done in three ways, namely primary prevention, secondary prevention, and tertiary prevention. Primary prevention is aimed at preventing the onset of hyperglycemia in individuals who are at risk of becoming DM sufferers. Secondary prevention is finding people with DM as early as possible so as to prevent complications. Tertiary prevention is all efforts to prevent complications, including preventing complications, preventing the progression of complications so that organ failure does not occur, and preventing body defects. Patients with DM must routinely control blood glucose levels according to a specified schedule so that the value of blood glucose levels is identified to prevent disorders and complications that may arise, as a result of which there is prompt and appropriate treatment.

At present, there are still many patients with DM who have not checked their glucose levels and have not made regular medical visits. This is because patients perceive that DM is a disease that can be cured in one examination.[2] One indicator of success in treatment is influenced by knowledge and patient compliance with treatment which is the main factor of therapeutic outcome.[3] Providing in-depth information about checking blood glucose levels is very important so that the risk of disease severity and complications decreases, blood glucose can be controlled, and compliance with blood glucose level checks increases.[4]

Methods

This research is an analytic survey research with a cross-sectional design. Research permission was obtained from the Health Research Ethics Committee (KEPK) STIKES Surya Global Yogyakarta, Indonesia, with the number 1.31/KEPK/SG/III/2020 on May 31, 2021. The subjects of this study were people with DM with diabetic ulcers on the feet. The instrument used in this study was a modified Morisky Medication Adherence Scale (MMAS-8) questionnaire for patients with DM. The eight-item MMAS-8 is a structured self-report measure of medication-taking behavior. Among self-report questionnaires, the MMAS-8 is the most widely-used scale for assessing medication adherence, because of its good sensitivity and specificity as well as its high validity and reliability.

This research was conducted in 5 wound care clinics spread across the Special Region of Yogyakarta (DIY) with a time span between March to June 2021. The accidental sampling method was used as the sampling technique. The sample size used was 26 people based on predetermined inclusion criteria. These criteria included patients with DM with diabetic foot ulcers who were undergoing wound care and were willing to become research respondents by filling out informed consent.

This research used univariate and bivariate data analysis. Bivariate analysis was used to determine the relationship between age and compliance with medical visits, age with adherence to blood sugar monitoring, and compliance with blood sugar monitoring with medical visits. Spearman's rank test was used in this bivariate analysis using the SPSS software (version 21, IBM Corporation, Armonk, NY).

Results

Respondents in the study were 26 patients. Demographic data showed that the number of men was the same as women, namely 50%. Most patients were in the age group of 49-57 years (42.3%). The most common degree of ulcer suffered by patients was in the second-degree group with a total of 38.5%. Most patients adhered to routine treatment of the hospital or specialist doctor's practice with a total of 30.8%. The patients' level of compliance with monitoring the blood glucose level was 53.8% adherent and 46.2% non-adherent. The patients' medication adherence was 65.4%

adherent and 34.6% non-adherent (Table 1).

Table 1. Respondents' characteristics

Variable	n (%)
Gender	
Men	13 (50.0)
Women	13 (50.0)
Age (year)	
39-48	5 (19.2)
49-57	11 (42.3)
58-68	10 (38.5)
Ulcer degree	
0	2 (7.7)
1	7 (26.9)
2	10 (38.5)
3	6 (23.1)
4	1 (3.8)
Place of treatment	
Hospital	8 (30.8)
Community health center	6 (23.1)
Initial clinic	4 (15.4)
Specialists	8 (30.8)

Analysis of the relationship between variables was carried out using the Spearman's rank test. The blood glucose level monitoring compliance variable was associated with medication adherence with a correlation coefficient of 0.462. Age was associated with compliance with monitoring blood glucose levels with a correlation coefficient of 0.248. Besides, the patients' age was also associated with medication adherence with a correlation coefficient of 0.211 (Table 2).

Table 2. Patients' adherence level

Variable	n (%)
Monitoring blood glucose levels adherence	
Yes	14 (53.8)
No	12 (46.2)
Medication adherence	
Yes	17 (65.4)
No	9 (34.6)

The results of the analysis related to the relationship between these variables can be seen in table 3.

Discussion

Monitoring blood glucose levels is an obligation that must be done for patients with DM. Controlled blood glucose levels are one of the therapeutic outcomes in DM in addition to preventing disease complications and improving the patient's quality of life. There are many factors that can affect compliance with monitoring blood glucose levels in patients with DM. The patient's duration of DM and the use of oral hypoglycemic drugs were associated with self-monitoring of blood glucose (SMBG). Patients who use oral hypoglycemic drugs have a low level of adherence to SMBG.[5] The results of this study indicate that adherence to monitoring blood glucose levels is associated with patient's medication adherence. This shows that patients who are obedient to monitoring blood glucose levels are also obedient to taking treatment regularly and vice versa.

Table 3. The relationship between age, blood glucose monitoring, and medication adherence

	Correlation coefficient	P
Monitoring blood glucose levels and medication adherence	0.462	0.018
Age and medication adherence	0.248	0.015
Age and monitoring blood glucose	0.211	0.047

Patient's compliance with monitoring blood glucose levels will provide motivation in medication adherence; additionally, patients who adhere to medication will always remember to monitor blood glucose levels regularly. Another study conducted in Faisalabad, Pakistan, stated that treatment adherence of patients with DM was related to socioeconomic status, information from doctors regarding the drugs used, patient knowledge about drugs, and regular monitoring of blood glucose levels by patients.[6] Supporting previous research states that there is a strong relationship between SMBG and Sitagliptin/Metformin adherence, where this relationship is very strong indicating a significantly large SMBG.[7] In

addition, it is supported by the research conducted by Rahmani and Permatasari which shows that blood sugar monitoring activities affect medication adherence which will affect blood sugar stability. One of the factors that also affects compliance with blood sugar monitoring and medication adherence is the form of counseling regarding blood sugar monitoring that is carried out routinely on patients with DM.[8]

Patients with DM who are obedient to treatment will use drugs regularly every day, adhere to a special low-carbohydrate diet for patients with DM, carry out routine controls even without complaints, and immediately make decisions if there is a change in their health status.[9] They are one of the determining factors for the success of therapy in addition to other factors such as the accuracy of selection and drug regimens as well as the patient's healthy lifestyle. Patients may lose the benefit of therapy and worsen the condition of the disease due to non-adherence. The uncontrolled state of blood glucose levels is the result of the patient's non-adherence to DM treatment which can cause complications of both macrovascular and microvascular diseases regularly.[10]

Monitoring blood glucose levels is one way of the management of clients with DM in addition to diet, activity, and medication. Continuous monitoring of blood glucose levels in clients with type II diabetes is one of the most important diabetes management practices for clients with diabetes. The concentration of glucose in the interstitial fluid can reflect glucose levels in a person's body; therefore, blood glucose monitoring does not always have to be done through invasive blood tests but blood glucose can be detected through the interstitial fluid released by the body through sweat.[11] Compliance is very important, especially in long-term treatment, one of it is used to monitor blood sugar levels. Compliance with blood glucose monitoring is

the ability or behavior of patients to carry out regular blood glucose checks twice a month either independently or with the help of health workers with the aim of reducing morbidity and mortality, which is specifically aimed at achieving two main targets, namely maintaining plasma glucose levels within the normal range and preventing possible complications. Patients with DM must regularly monitor blood glucose levels according to a specified schedule so that the value of blood glucose levels is known to prevent disturbances and complications that may arise, and as a result, there is fast and appropriate treatment. Full compliance (total compliance) means that DM sufferers not only seek treatment regularly according to the stipulated time limit but also obediently check blood glucose levels and take medication regularly according to instructions.[12] Adherence to monitoring blood glucose is influenced by many factors, one of which is age.

In this study, it is known that age affects blood glucose monitoring compliance. The older a person is, the more mature he/she is in thinking and working. The more mature a person is, the more mature they will think and act. Age affects a person's mindset and behavior. A person's age is broadly an indicator in every decision-making and refers to every experience. The older a person is, the more responsible and experienced they will be in receiving instruction and in carrying out a procedure. Aging is accompanied by an increase in experience and skills.[14] The study by Virdi et al. states that age influences the SMBG which is combined with education to the patient.[15] A similar study by Patton suggests that age influences the SMBG or continuous glucose monitoring (CGM) which has an important role in managing diabetes and reducing the risk of diabetes complications.[16]

Based on the data from this study, the majority of respondents aged 49-57 years with a percentage of 42.3%. Other studies also

strengthen this result where the age group above 45 years is also the most sufferer from DM with a percentage of 78.8%.[17] At the age higher than 45 years, there will be an aging process and changes in the anatomy and physiology of the body. This condition often causes obesity which causes insulin to become insensitive, resulting in an increased risk of diabetes. This is because the ability of beta cells to metabolize glucose to produce insulin decreases with increasing age.[18]

The results showed that there was a relationship between age and adherence to medical visits. This is also supported by research that shows age, gender, and marital status have a relationship or correlation with adherence to medical visits. Those with lower age will have better knowledge than the older people. Younger patients tend to be more educated than the elderly; thus, they will understand and remember knowledge about their illness more quickly.[19] A better level of education and knowledge will increase patient's compliance in terms of treatment visits.[20] Jannoo and Khan state that age has an important effect on drug adherence where the older age, 44-64 years old and more than 65 years old, is very significant for drug adherence.[21]

Compliance with making medical visits at healthcare facilities, hospitals, clinics, and practicing doctors is one way to prevent complications such as diabetic foot ulcers in patients with DM. With regular medical visits, glucose levels in patients with DM will always be monitored. In addition, regular examination of glucose levels can indicate the success rate of treatment carried out on these patients.[22]

Conclusion

Adherence to monitoring blood glucose levels is related to medication adherence in patients with DM with diabetic ulcers. In addition, the age variable in these patients has a relationship with blood glucose level monitoring compliance and medication adherence.

Conflict of Interests

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