ORIGINAL ARTICLE

Self Monitoring Effect on Glycemic Control of Type 2 Diabetes Mellitus Patients

HARIYONO HARIYONO
Medical-Surgical Nursing Department School of Health Science Insan Cendekia Medika Jombang
Correspondence to Hariyono Hariyono, Email: hari_monic@yahoo.com

ABSTRACT

Background: Self monitoring is an effective way for people with diabetes mellitus (DM) to get good glycemic control for diabetes mellitus patient recovery.
Aim: To control HbA1c levels so as to reduce the recurrence of type 2 diabetes mellitus patients so that they would improve the quality of life
Methods: This research used a pre-experimental pre-post-test design. The population of this research is all DM patients in Bulurejo Village, Diwek District, Jombang Regency with a sample of 30 respondents. In this research, we used a purposive type sample. The variable of this research is self-monitoring and glycemic control. The way of collecting data is by a laboratory test.
Result: The results showed that self-monitoring effect on glycemic control in DM patients according to the Wilcoxon test, the glycemic control score p=0.046 (p<0,05). The glycemic control before the intervention almost all respondents had uncontrolled HbA1C levels of 28 respondents or 93.3% and after the intervention, almost all respondents had uncontrolled HbA1C levels of 24 respondents or 80%.
Conclusion: Self-monitoring can improve glycemic control quite well, but still needs integration with other components related to treatment and care in diabetes mellitus patient, with self-monitoring it is expected that they will be able to increase their motivation to support increased self-care abilities, change behavior and carry out activities to maintain glycemic control.
Keyword: *Self Monitoring,* Glycemic Control*,* Diabetes Mellitus

INTRODUCTION

Diabetes mellitus in some developing countries has increased significantly due to the increasing population of aging, changes in diet, severe physical activity, and unhealthy behavior patterns. The level of blood glucose in diabetes mellitus is also influenced by low self-monitoring in which sufferers cannot control themselves against factors that can trigger disorders of blood glucose level monitoring in patients with type 2 diabetes mellitus (Hariyono, 2016). Diabetes mellitus has a severe impact on the psychological, social, physical, economic and cultural aspects of individuals, a person with diabetes mellitus tends to try to adapt as best they can, but not infrequently they do not have the knowledge and skills to make decisions and act accordingly so that a sustainable process is appropriate with the patient condition, hospital care is more meaningful if it is continued with home care, but until now the planning for patients treated has not been optimal (Nursalam, 2014).

One of the activities in self-regulatory intervention is discharge planning while the patient is hospitalized, because it will monitor the patient daily activities so that it will have an impact on shortening the length of patient hospitalized time, and will reduce the patient recurrences rate. The implementation of discharge planning has become one of the program activities in the system of providing nursing care to clients. But in its implementation, planning to go home is not appropriate and not optimal and is done when the patient is in the hospital (Rofi'i, 2013).

The purpose of this study was to control HbA1c levels so as to reduce the recurrence of type 2 diabetes mellitus patients so that they would improve the quality of life. Discharge planning ased self regulation model is a specific action for chronic disease patients who aim to facilitate the transition from hospital to home, understand and improve the management of chronic disease patients including type 2 diabetes mellitus, continuing care between hospitals and community services, regulatory planning effective self is very important to ensure continuity of nursing and prevent disease recurrence (Steward, 2002).

International Diabetes Federation (IDF) calculates the incidence of Diabetes Mellitus in the world in 2012 was 371 million, in 2013 it increased to 382 mill.ion and it is estimated that in 2035 people with Diabetes Mellitus will increase to 592 million (Ministry of Health, 2014). Based on the 2013 Annual Report of Hospitals in East Java, Diabetes Mellitus sufferers (102,399 cases) (Profile of the East Java Health Office, 2014). Based on data from the Jombang district health office, the number of people with Diabetes Mellitus in 2014 was 21.992 (Jombang District Health Office, 2014).

Various problems that arise due to diabetes mellitus can not be separated from the occurrence of various kinds of complications, especially long-term complications, so that maximum effort is needed to prevent the occurrence of complications, the main key to delaying even preventing complications of diabetes mellitus is by controlling blood sugar (Pieber, 2003). Besides that, we also need to improve the quality of life of patients. So the goal of managing patients includes two important things, namely metabolic control and quality of life of patients (Rose et al, 2002). Recurrence of diabetes mellitus can be done in many ways to reduce recurrence. One of them is self-monitoring, where the method of self-monitoring is a person's self-control process in controlling behavior and monitoring behavior to achieve certain goals by using strategies and involving physical, cognitive, motivational, and social elements.

Self-monitoring is a process where individuals observe and feel sensitivity to everything about themselves and their environment (Azis, 2005). Self-evaluation/judgmental process is how a person evaluates himself against his behavior in the surrounding environment. The self-response is someone who can evaluate themselves positively or negatively, the cognitive function makes a balance that can evaluate positive or negative becomes less meaningful individually (Alwisol, 2016).

MATERIALS AND METHODS

This study uses a pre-experimental pre-post test design. The study population was all diabetes mellitus (DM) patients in Bulurejo Village Diwek District Jombang Regency with a sample of 30 respondents. The sampling technique is purposive sampling. The variables of this study include self-monitoring and glycemic control. Glycemic control data collection using laboratory tests HbA1c levels.

The process of data collection begins first by selecting prospective respondents and allowed to understand research. Filling out the questionnaire sheet for the pre-test is done after the prospective respondent approves, then the HbA1c value is measured by the family.

Respondents were then given self-monitoring interventions after the intervention period was completed, the researcher conducted a post-test on the respondents of the study by measuring HbA1c levels. The collected data is then processed by the researcher and analyzed the results and conclusions of the study using the Wilcoxon test.

RESULT

The results of the study of the effects of self-monitoring on glycemic control of patients with type 2 diabetes mellitus in the village of Bulurejo, District of Diwek, Jombang Regency, collected data including general data such as age, gender, education, and employment. Characteristics of respondents based on age according to the results of the study as shown in table 1 it is known that almost all are aged> 35 years as many as 24 respondents or 80%. Characteristics of respondents based on gender according to the results of the study as shown in table 2 it is known that most of the male and female sexes are 15 respondents or 50% respectively.

Characteristics of respondents based on education according to the results of research as shown in table 3 it is known that almost half of them have a high school education namely as many as 9 respondents or 30%. Characteristics of respondents based on work according to the results of the study as shown in table 4 it is known that half of them have self-employment namely as many as 14 respondents or 46.7%. Characteristics of respondents based on HbA1C levels according to the results of the study as shown in table 5 it is known that before the intervention almost all respondents had uncontrolled HbA1C levels of 28 respondents or 93.3%. Characteristics of respondents based on HbA1C levels according to the results of the study as shown in table 6, it is known that after intervention almost all respondents had uncontrolled HbA1C levels of 24 respondents or 80%. Characteristics of respondents based on HbA1C levels by following table 7 shows that almost all respondents before the intervention and after intervening remained had uncontrolled HbA1C levels of 24 respondents or 80% and a small proportion of respondents before the intervention and after the intervention had controlled HbA1C levels namely as many as 4 respondents or by 13.3%.

Table 1 Characteristics of Age (n=30)

Age	Frequency	%age
<20 year	0	0
20-35 year	6	20
>35 year	24	80

Table 2. Characteristic of sex (30)

Sex	Frequency	%age
Man	15	50
Woman	15	50

Table 3. Characteristics of Education (n=30)

Education	Frequency	%age
Elementary School	8	26,7
Junior High School	8	26,7
Senior High School	9	30,0
Diploma/Bachelor	5	16,7

Table 4. Characteristics of Job (n=30)

Job	Frequency	%age
Does not work	6	20
Farmer	6	20
Entrepreneur	14	46,7
Civil Servant	4	13.3

Table 5 Characteristics of HbA1C (n=30)

HbA1C	Pre	
	Frequency	%age
Controlled	2	6,7
Not controlled	28	93.3

Table 6 Characteristics of HbA1C (n=30)

HbA1C	Post	
	Frequency	Percentage
Controlled	6	20
Not controlled	24	80

Table 7 Crosstab of HbA1C

Pre	Post				Total	
	Controlled		Not controlled			
	Frequency	%age	Frequency	%age	Total	%age
Controlled	2	6.7	0	0	2	6.7
Not controlled	4	13.3	24	80	28	93.3
Total	6	20	23	80	30	100

p=0,046 (p<0,05)

DISCUSSION

Glycemic control of diabetes mellitus patients before self-monitoring: Glycemic control in people with diabetes mellitus based on the results of research before giving self-monitoring shows that almost all of the study respondents had uncontrolled glycemic control and only a small proportion of the study respondents had controlled glycemic control.

Self-care for people with diabetes mellitus is a process of developing knowledge or awareness to learn to survive the complex nature of diabetes mellitus and self-care in people with diabetes mellitus should be directed related to healthy food behavior, physically active, monitoring blood glucose levels, appropriate treatment, problem solving with healthy coping, as well as behaviors that reduce risk (Shrivastava, 2013). Poor control of glucose metabolism is characterized by increasing blood sugar levels or hyperglycemia (Suyono 2007).

The uncontrolled condition of glycemic control according to the researcher illustrates that the biggest change or contribution in controlling glycemic control in people with diabetes mellitus lies and is very dependent on the behavior of the patient itself, whether obedient or not on the intervention has given regarding patient care and handling given by health workers.

The results of the study also showed that almost all respondents were over 35 years old and a small percentage were under 35 years old. ch as type of diabetes, type of treatment, degree of control to be achieved, age of the patient, available facilities, knowledge, and motivation of the patient.

The age factor according to the researcher influences the condition of the respondents' glycemic control. Although no age-related analysis was carried out, the age of respondents according to the researchers significantly contributed to uncontrolled glycemic control conditions because knowledge and attitudes with increasing age play a role in shaping a person's health behavior, although there are also other factors that influence health behaviors such as personality systems, experiences, customs held by individuals and the existence of supporting factors or conditions that allow such adequate facilities.

Glycemic control of diabetes mellitus patients after self-monitoring: Glycemic control in people with diabetes mellitus based on the results of the study after being given self-monitoring showed that almost all of the study respondents had uncontrolled glycemic control and only a small proportion of the study respondents had controlled glycemic control.

The theory of Zimmerman and Pons (1990) states that one of the factors that influence self-monitoring is an environment that depends on the form of support from the environment, the existence of family support coupled with health workers causes the client's controlled self-monitoring to be high because of two sources of support that trigger pressure greater for self-monitoring, support from health workers in the form of monitoring the course of therapy triggers patients to try to meet external demands, namely managing diabetes mellitus well. People with diabetes mellitus should get education about self-care because it is important to support self-care, their glycemic control and education is an important element because it helps optimize blood glucose control to prevent complications (ADA 2013; IDF 2012). This is also supported by the opinion of Shrivastava (2013) who states that self-care of people with diabetes mellitus is a process of developing knowledge or awareness to learn to survive the complex nature of diabetes mellitus and self-care in people with diabetes mellitus. physical, monitoring blood glucose levels, appropriate treatment, solving problems with healthy coping, and reducing risk behavior.

According to the researchers, almost no significant changes after being given an intervention showed that the adaptation process of people with diabetes mellitus to their self-concept, role, and dependency of patients illustrates that the condition of the disease becomes a source of stimulus or stress that affects physiological and psychosocial conditions that have an impact on changes in glycemic control. The results showed that in percentage terms the condition of glycemic control was indeed uncontrolled, but there were changes related to the conditions in some respondents which were quite significant after being given intervention, this indicated that self-monitoring had a strong influence in contributing to changes in respondents' physical adaptation responses to stressors. Self-management that is balanced with education in people with diabetes mellitus is indeed important in the self-management of patients so that they can control the condition of glycemic control to be better.

The results of the study also showed that almost half of the study respondents had education at the high school, junior high and elementary levels and only a small proportion possessed education at the level of D3 or Bachelor.

Knowledge of cognitive is a very important domain for the formation of a person's actions or behavior. The patient's knowledge of diabetes mellitus is a tool that can help patients to manage diabetes during their lives so that more and more people understand the disease better understand how to change their behavior (Waspadji 2009; Notoatmojo 2007). Education and training for people with diabetes mellitus is an education about knowledge and skills for people with Diabetes Mellitus to support behavior change, improve understanding of the disease so that optimal health is achieved, adjusting psychological conditions and improving quality of life (Soegondo et al., 2009).

Age factors according to researchers although in this study no statistical analysis was conducted, educational factors also contributed to changes in glycemic control conditions in people with diabetes mellitus. Patients who have higher education will be able to receive the knowledge provided through education so that it will change the mindset of patients and can increase knowledge about diabetes mellitus and management. Also besides, with a good education base, people with diabetes mellitus will be easier and able to respond well to any intervention given so that changes in the condition of the glycemic control can change to be controlled. However, the absence of significant changes related to the condition of glycemic control in respondents indicates that management

in DM patients does not only focus on one model or intervention method but also requires treatment, care or education and requires a comprehensive approach to meet complex needs. for DM patients both physiological related needs, education and psychological support.

Effect of self-monitoring on glycemic control in people with diabetes mellitus: Glycemic control based on the results of the study showed that almost all respondents after self-monitoring still had uncontrolled glycemic control as many as 24 respondents but the results of the analysis statistically showed that there was an effect of self-monitoring on glycemic control in people with diabetes mellitus.

Management of DM to prevent complications includes 5 pillars, namely eating planning, physical exercise, medication, counseling, and monitoring glucose levels themselves, management of this DM must be done for life so often patients are not obedient and tend to become discouraged (Aini, 2011; Mashudi, 2011) According to Ormrod (2009) the characteristics of people who are able to perform self-monitoring properly depend on one of them is the monitoring of emotions, a process that always checks or intentionally changes feelings that might lead to counterproductive behavior.

Sudden changes in life-related to the management of disease treatment and care for people with diabetes mellitus who have to undergo routine life make people with diabetes mellitus lead to the emergence of several negative psychological responses such as anger, feeling useless, increasing anxiety, and stress. Such conditions according to researchers indeed play an important role in the ability of patients to carry out self-care management and if they can do so the results they get can be seen one of which is a controlled blood glucose condition.

Glycemic control based on the results of the study showed that a small proportion of respondents who had glycemic control from uncontrolled became controlled after being given self-monitoring and respondents who before being given self-monitoring had controlled glycemic control and after that remained constant controlled.

Controlled self-monitoring is caused by interpersonal or intrapsychic pressure (McCarty et al, 2008 in Kusumadewi, 2011). One form of self-monitoring is external, one example of this external form of self-monitoring is that people are involved in an activity or pursue goals to meet external demands, avoid punishment, or get prizes (Vansteenskie, 2010).

Controlled self-monitoring according to researchers is influenced by external factors that cause a person to experience pressure so that they conduct self-monitoring. This is what distinguishes patients who get support only from families. Patients who get support from the family feel that they do not get support from health workers in undergoing therapy so that the external demands they feel are fewer, this causes respondents to have low self-monitoring so that the ability to change glycemic control conditions

CONCLUSIONS

Glycemic control of diabetes mellitus sufferers are almost entirely before uncontrolled self-monitoring. Glycemic control of people with diabetes mellitus are almost entirely partially before uncontrolled self-monitoring is given but there are changes. Self-monitoring affects the glycemic control in people with diabetes mellitus

RECOMMENDATIONS

1. Self-monitoring has an influence on glycemic control in people with diabetes mellitus, self-monitoring can provide positive changes related to knowledge and attitudes, but it will be more beneficial if the intervention is carried out intensively and longer as well as assisted individually or in groups.
2. Patients with diabetes mellitus need to have a plan after getting knowledge or education so that they can maintain the condition of glycemic control and remain good at carrying out self-care activities.
3. Nurses need to optimize and participate in self-care activities of people with diabetes mellitus intensively to increase the motivation of people with diabetes mellitus to support the achievement of glycemic control in people with diabetes mellitus to be more controlled.

Declaration: The author declare no conflict of interest

REFERENCES

1. Aini, N., Fatmaningrum, W., Yusuf, A. (2011). Upaya meningkatkan perilaku pasien dalam tatalaksana diabetes mellitus dengan pendekatan teori model behavioral system Dorothy E. Johnson. Jurnal Ners, 6 (1) 1-11
2. American Diabetes Association 2013, Standart of medical care in diabetes, *Diabetes Care*
3. Kusumadewi, Melina Dian. (2011). Peran stresor harian, optimisme dan regulasidiri terhadap kualitas hidup individudengan diabetes melitus tipe 2. PsikoIslamika, Jurnal Psikologi Islam (JPI), 8 (1), 43-62
4. Mashudi. (2011). Pengaruh progressive muscle relaxation terhadap kadar glukosa darah pasien diabetes tipe 2. Fakultas Ilmu Keperawatan Universitas Indonesia. Tesis
5. Notoatmodjo, S 2007, *Promosi Kesehatan dan Ilmu Perilaku*, Rineka Cipta, Jakarta
6. Nursalam 2014, *Manajemen Keperawatan: Aplikasi Dalam Praktik KeperawatanProfesional,* Salemba Medika, Jakarta
7. Ormrod, J.E. (2009). Psikologi Pendidikan.Jakarta: Erlangga
8. Perkeni 2015, *Konsensus pengelolaan dan pencegahan diabetes mellitus tipe 2 di Indonesia*, PB PERKENI, Jakarta
9. Shrivastava, S.R., Shrivastava, P. S., & Ramasany, J. 2013, Role of self care in management of diabetes mellitus. Journal of Diabetes & Metabolic Disorder
10. Soegondo, Soewondo & Subekti 2009, *Penatalaksanaan diabetes mellitus terpadu*, Balai Penerbit UI, Jakarta.
11. Stewart, S. & Horowitz, J.D. 2002. Home-Based Intervention in Congestive Heart Failure. *European Heart Journal*, pp.2861–2866.
12. Suyono, Slamet 2007, Penatalaksanaan diabetes melitus terpadu: sebagai panduan penatalaksanaan diabetes melitus bagi dokter dan educator, Balai Penerbit FKUI, Jakarta
13. Vansteenkiste, M., Smeets. S., Soenens, S., Lens, W., Matos, L., Deci, E.L. (2010). Autonomous and controlled monitoring of performance-approach goals: Their relations to perfectionism and educational outcomes. Motiv Emot, 34, 333–353
14. Waspadji, S 2009, *Diabetes Mellitus: Mekanisme Dasar dan Pengelolaan yang Rasional*, Balai Penerbit FKUI, Jakarta
15. Zimmerman dan Pons, (1990). Construct validation of a strategy model of student self regulated learning. Journal of Educational Psychology, Vol 80(3), 284-290.