

Effectiveness of self-care monitoring on self-behavior of diabetes mellitus patients

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ABSTRACT

Background : Diabetes Mellitus is called the silent killer because this disease can affect all organs of the body and cause various kinds of complaints. Chronic hyperglycemia can affect the sufferer's quality of life and cause rehospitalization. Decreased quality of life is caused emergence of hyperglycemia complications.. Controlling diabetes mellitus includes monitoring blood sugar levels, exercise or physical activity, diet, education and drug of diabetes mellitus. Diabetes mellitus is a metabolic disease that causes complications. The problem of complications is prevented by performing the 4 pillars of self-care while at home.

Objectives : The purpose of this research is to determine the effectiveness of DM management on self-care.

Methods : The research design in this study used a quantitative descriptive quasi-experimental method . The sampling technique used accidental sampling with a total of 30 respondents. Data analysis used the Wilcoxon test to determine pre and post results in each group and used the Mann Whitney test to determine the mean difference in the two groups. Inclusion criteria included respondents who were registered as prolanis members. The research instrument used a self-care monitoring sheet with the SDSCA (Summary of Diabetes Self-Care Activity) questionnaire with r table value 0.361

Results : The result is the Asymp.Sig value. (2 tailed) has a value of 0.001, so H_a is accepted, which means there is a difference in self-care ability between before being given DM management and after being given DM management. Based on the findings of researchers in this study, the value of Asymp.Sig. (2-tailed) value is 0.001, meaning that H_a is accepted. there is a difference between pretest and posttest in both the control and intervention groups.

Conclusions : There is a difference in the average self care ability of diabetes mellitus patients using monitoring sheets. The conclusion is that the self-care management programme is effective on self-behavior.

KEYWORD : DSME; diabetes mellitus; self care;

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INTRODUCTION

Diabetes Mellitus is a metabolic disease characterized by increased blood glucose levels due to the pancreas being unable to produce insulin or lack of insulin sensitivity in target cells. The incidence of Type 2 DM in women is higher than men. Women are at greater risk of developing diabetes because physically women have a greater chance of increasing their body mass index. The high prevalence of type 2 diabetes mellitus is caused by risk factors that cannot be changed, for example gender, age, and genetic factors. The second is risk factors that can be changed, for example smoking habits, education level, occupation, physical activity, smoking habits, alcohol consumption, mass index. Body, waist circumference and age(1).

Diabetes Mellitus is called the silent killer because this disease can affect all organs of the body and cause various kinds of complaints. Diseases that will be caused include eye vision problems, cataracts, heart disease, kidney disease, sexual impotence, wounds that are difficult to heal and rot/gangrene, lung infections, blood vessel disorders, stroke and so on. It is not uncommon for serious DM sufferers to have their limbs amputated due to decay (2). This can cause complications such as a high risk of morbidity and mortality in patients. Diabetes mellitus is a metabolic disease whose main treatment is lifestyle changes, and requires adherence to long-term therapy(3).

In general, there are five principles for managing diabetes mellitus in accordance

with the 2006 Diabetes Mellitus Management Consensus in Indonesia, namely to improve the quality of life of DM patients. The ultimate goal of management is to reduce DM morbidity and mortality. To achieve this goal, it is necessary to control blood glucose, blood pressure, body weight and lipid profile, through holistic patient management by teaching self-care and changing behavior(4).

The involvement of all health workers is needed for prevention, one of which is the *Diabetes Self Management Education* (DSME) method (7). The Diabetes Self Management (DSME) approach can be applied to facilitate the knowledge, attitudes and self-care skills of patients with the health team (7)(8). The implementation of Diabetes Self Management Education has been widely researched. Intervention with education using booklet media compared to the control group without education provides results that the self-care of patients who are given education is better (independent) compared to the self-care of patients who are not given education, this research has been reported by (11). The research conducted aims to determine the effectiveness of booklets as a medium for education.

DSME has a positive impact on diabetes mellitus patients in self-care with monitoring by health workers at home. care monitoring. The development of research that has been carried out for self-care of Diabetes Mellitus patients has been carried out by (12) and then developed by (13) with the application of a DM calendar using an android

application as a medium for Diabetes Self Management Education compared to the application of DSME using liflet alone. The features presented are features of exercise control, DM diet control, medication control, blood sugar level control which are presented in a complete and informative manner. The weakness in this study is that education has not been carried out on an ongoing basis and its function is only as a reminder.

MATERIALS AND METHODS

The research has received ethical clearance form Muhammadiyah University of Surakarta number 5029/B.2/KEPK-FKUMS/IX/2023. The design in this research uses a quantitative type of research with the onegroup pretest-posttest design method.

The population in this study were Chronic Disease Management Programme (PROLANIS) members with a total of 30 participants, the sampling technique was a total sample of 30 respondents divided into 15 respondents in the control group and 15 respondents in the intervention group. Inclusion criteria diabetes mellitus patients registered as PROLANIS members and diagnosed with diabetes mellitus.

The instrument used in this study was a self-care monitoring sheet that has been tested by experts and the Summary Diabetes Self Care Activity (SDSCA) questionnaire with 19 question items with the lowest score of 0 and the highest score is 7, there is one question item whose answers are 1 and 0, namely on the question item about smoking.

The validity test results show r count in the range of $r = 0.20-0.74$, this means that the instrument is valid and the value of reliability $\alpha: 0.81$ ($r \text{ alpha} > 0.36$).

The control group and the treatment group were carried out a pretest by filling out the SDSCA questionnaire and continued with the education about diabetes mellitus treatment, foot exercises, foot care, and nutrition in diabetes mellitus patients to the treatment group. The intervention group was monitored by the researcher during the 3-month self-care program. Post tests were also given to the control and treatment groups. The Mann Whitney test was used in this study.

RESULTS AND DISCUSSION

RESULTS

Based on **Table 1**, it was found that the frequency distribution of age average 60,47 years, BMI 25,81 and average blood sugar 152 in the control group. Average age 54,53 years, BMI 25,47 (overweight) and average blood sugar 136.07 g/dl in the intervention group.

Based on **Table 2**, distribution of monitoring results of self care behavior consist of physical activity/sports and diet. In the control group sports / physical activity with a frequency of 2 times a week with a duration of 21 minutes, eating time 2-3 times a day in the control group. The intervention group sports / physical activity with a frequency of 6 times a week with a duration of 29 minutes, eating time 2-3 times a day.

Table 1. Distribution of age, BMI and average blood sugar (n=30) on intervention and control groups

Characteristic	Group	Mean	Median	Std. Deviation	Minimum	Maximum
Age	Control	60.47		8.459		
BMI		25.81	60	4.006	45	75
Average blood sugar level		152	26.7	59.0194	17	31
	Intervention		85		80	284
Age		54.53	54	11.91	30	80
BMI		25.47	24.2	4.315	19	36
Average blood sugar level		136.07	132	45.775	73	253

Table 2. Distribution of monitoring results of self-care behavior of Diabetes Mellitus patients (n=30)

Indicator	Mean	Std. Deviation	Minimum	Maximum
Control Group				
Physical activity / sport:				
Exercise frequency (how many times/week)	2.9	3.04	0	7
Exercise duration (minutes)	21	20.2	0	60
Diet:				
Eating time	2.4	0	1.05	3
Intervention Group				
Physical activity / sport:				
Exercise frequency (how many times/week)	6	5.8	0	25
Exercise duration (minutes)	29	18.14623	0	75
Diet:				
Eating time	2.6	0.82808	0	3

Based on **Table 3**, in the control group the results most of the respondents are female (73%) with the last education of high school (47%), most of them have diabetes mellitus for less than 5 years (73%) , 6 respondents (40%) did not exercise, and 6 respondents (40%) did walking exercise. Respondents consume a diet according to calorie needs by consuming snacks 2 times a day (66,7 %), most of them take diabetes

mellitus medication, and most of them do foot care. In the intervention group the results most of the respondents are female (60%) with the last education of elementary school (33%), most of them have diabetes mellitus for less than 5 years (53%) , 8 respondents (53,3%) did walking exercise. Respondents consume a diet according to calorie needs by consuming snacks 2 times a day (66,7 %), most of them take diabetes mellitus

Table 3. Frequency distribution of monitoring results of self-care behavior of Diabetes Melitus patients (n=30)

Indicator	Group	Frequency	Percentage
Gender	Control		
Male		4	27%
Female		11	73%
Level of education			
Elementary school		5	33%
Middle school		1	7%
High school		7	47%
Bachelor's degree		2	13%
Long suffering:			
< 5 years		11	73%
> 5 years		4	27%
Exercise:			
Type of exercise :			
Not doing		6	40%
Gymnastics		3	20%
Walk		6	40%
Bicycle		0	0%
Food type:			
Not suitable for DM diet		2	13.30%
Appropriate		13	86.70%
Food snacks:			
Don't eat snacks		2	13.30%
One type of snacks (fruit)		3	20%
Two types of snacks (fruit and snacks)		10	66.70%
Taking DM medication:			
No medication		2	13.30%
Take medicine		13	86.70%
Foot Care:			
Check the feet			
Didn't do it		4	26.70%
Do		11	73.30%
Cleaning feet:			
Didn't do it		2	13.30%
Do		13	86.70%
Cut nails properly:			
Didn't do it		1	6.70%
Do		14	93.30%
Use of safe footwear:			
Didn't do it		1	6.70%
Do		14	93.30%

Gender	Intervention		
Male		6	40%
Female		9	60%
Level of education			
Elementary school		5	33%
Middle school		4	26.70%
High school		3	20%
Bachelor's degree		3	20%
Long suffering:			
< 5 years		8	53%
> 5 years		7	47%
Sport :			
Type of sport:			
Not doing sports		1	6.70%
Gymnastics		5	33.30%
Walk		8	53.30%
Bicycle		1	6.70%
Food type:			
Not suitable for DM diet		1	6.70%
Appropriate		14	93.30%
Food snacks:			
Don't eat snacks		1	6.70%
One type of distraction (fruit)		3	20%
Two types of snacks (fruit and snacks)		11	73.30%
Taking DM medication:			
Don't drink		2	13.30%
Take medicine		13	86.70%
Foot Care			
Check the feet			
Didn't do it		8	53.30%
Do		7	46.70%
Cleaning feet:			
Didn't do it		3	20%
Do		12	80%
Cut nails properly:			
Didn't do it		2	13.30%
Do		13	86.70%
Use of safe footwear:			
Didn't do it		2	13.30%
Do		13	86.70%

medication (86,7%), and most of them do foot care (86,7%).

Based on **table 4**, the results of the mann whitney test obtained a p value = 0.001 which shows indicates a difference in self-care using monitoring sheets and not using monitoring sheets.

Table 4. Bivariate mann whitney test effect of self monitoring on self behavior of diabetes melitus patients

	Self care score
Mann Whitney	34
Wilcoxon W	154
Z	-3.258
Asymp. Sig. (2-tailed)	0.001

DISCUSSION

Based on **Table 1**, This research shows that the average age of DM sufferers is 54 years - 60 years, however, diabetes mellitus sufferers currently not only suffer from those over the age of 40 but there are those under the age of 30 who suffer from the disease. Because Diabetes Mellitus is a metabolic disease caused by lifestyle such as irregular eating patterns, not doing physical activity/exercise, work factors, stress or it can also be caused by genetic factors. The causes of Diabetes Mellitus are very diverse accompanied by disorders of carbohydrate, protein and metabolism. fat as impaired insulin secretion and decreased insulin activity.

This metabolic disorder can be caused by an unhealthy lifestyle, which can trigger blood glucose levels to rise uncontrollably (5).The average BMI in the results of this

research is in the overweight category. Of the 30 studies conducted, 25 studies explained that the influence of obesity on the incidence of DM complications showed significant data.Obesity is a causative factor in the emergence of DM disease where fat deposits due to obesity cause insulin resistance so that insulin does not work properly and sugar levels can increase. Apart from that, obesity can also trigger hypertension and high blood fat(6). High blood fat can accelerate the occurrence of atherosclerosis where this condition causes circulation to various organs to worsen so that microvascular complications can occur, namely retinopathy and nephropathy, macrovascular complications, namely arterial and coronary heart disease. Meanwhile, neuropathy is a complication of microvasculature and macrovasculature(7).

Based on **Table 2 and Table 3**, Promotional and preventive efforts that can be carried out are self-care monitoring which consists of monitoring physical activity, monitoring DM diet, monitoring taking medication, monitoring blood sugar levels and education about foot care. The aim of this promotive and preventive effort is to control/control criteria in the form of checking glucose levels, HbA1C and lipid profile. The definition of DM can be controlled if blood glucose levels, lipid levels and HbA1C reach the expected levels. Nutritional status and blood pressure are in accordance with the specified targets within normal limits(8).

Self care: HealthyEating (healthy food/ diet) means eating 3 times a day, mostly

eating between 2 meals a day with fruit and snacks. Respondents in this study have received education about the DM diet and have received calorie calculations adjusted to individual activities. The measurement dimensions in this research are meal times, following meal plans and types of meal breaks. Young people with diabetes tend to overeat, while older people limit the type of food they eat because they are afraid that their blood sugar will increase(9). *Self care: Being Active*(active in activities/sports) in the intervention group 1 person did not exercise, while in the control group 6 people did not exercise. The average duration of exercise is 21 minutes with a frequency of 2-3 times per week. This has similarities with research conducted by Sri Indaryati, 2018, namely the average activity was 3.38 days a week –(10).

Self care: taking medication (drug use). The measurement dimension in this research is monitoring the regularity of taking medication with the result that the majority (13 respondents) took medication according to the doctor's prescription in the intervention group and 12 respondents in the control group.

This is not the same as the measurement dimensions carried out by (11) with the frequency of taking medication and estimated intervals for taking medication. This monitoring dimension is in accordance with Orem's theory that individuals who are sick will seek medical help and tend to comply. Compliance with taking medication when sick is the easiest type of compliance for diabetes

patients compared to other self-care behaviors(12). *Self-Care: Self Monitoring Blood Glucose*(Self-Monitoring Blood Glucose) The results of this research show that blood glucose monitoring is carried out once every 28 days.

Different from the results of research conducted by(13) monitoring blood glucose on average for 1.9 days a week. This difference lies in the dimension of frequency of checking their own blood sugar, which is rarely done by respondents. Meanwhile, the blood sugar level monitoring program is carried out once a month, which is a PROLANIS program from the health service. *Self-Care: Reducing Risk: Diabetic feet*(Reduces the Risk of Diabetic Feet). The measurement dimension in this research is in the form of foot care actions with an assessment of whether they are carried out or not carried out.

The measurements taken are checking the feet, cleaning the feet, cutting the nails and wearing footwear (14). Management of the 5 pillars of diabetes mellitus is an effort to prevent complications. patients in carrying out prevention need to be assisted by health workers during self-care at home. In line with the results of previous studies that the 5 pillars of diabetes mellitus can improve quality of life with a P value: 0.003. The longer suffering from diabetes mellitus can affect the physical and mental condition of the patient resulting in complications. prevention of complications can be done with self-care at home with monitoring from health workers

(15).

Based on **Table 4**, Mann Whitney test of posttest shows the p value = 0.01. The results showed that monitoring patient self-care at home for 3 months which includes physical activity monitoring, medication monitoring, blood sugar level monitoring and diet monitoring can improve the self-care ability of patients with diabetes mellitus. The main problem in health services for DM patients is that the handling of DM cases is not yet optimal and there is no culture to provide optimal independence for patients. Independent diabetes behavior according to the American Association Diabetes Education (AADE) includes Healthy eating (healthy food), being active (actively moving or exercising), Self Monitoring Blood Glucose (SMBG) or self-monitoring of blood sugar), taking medication (using medication), problem solving (problem solving), healthy coping (positive coping) and reducing risks (reducing the risk of complications)(16). Self-care monitoring is included in DSME (Diabetes Self Management Education), the components include basic knowledge, treatment consisting of insulin use including dosage, type of insulin, injection method and others. Monitoring includes an explanation of monitoring, objectives, results, strategies, equipment used in monitoring, frequency and time of inspection(17). Monitoring activities include nutritional needs which include diet management, calorie needs, eating schedules, weight control and eating disorders(18). Sports and activity monitoring activities

include evaluating medical conditions before exercising and after exercising including blood pressure, pulse, breathing and general/physical condition. Foot care monitoring activities include foot disorders, causes and symptoms, how to prevent them, complications, treatment(19). Meanwhile, the implementation of DSME was carried out over 4 sessions with a time span of 1-2 hours, consisting of session 1 explaining basic knowledge, session 2 explaining nutrition management, session 3 explaining DM foot care and session 4 about stress management (13,12).

The management of self-care must be fully understood by the patient himself so that this self-care can be carried out well, for this reason, communication with health workers is very important in enforcing self-care(20). Communication with health workers can be done by providing health information or education about the five domains or indicators of self-care behavior itself. This information must be clearly conveyed so that the client has a broad understanding regarding the disease they are experiencing (21). If communication is carried out well, self-care is proven to be implemented optimally so that the patient's blood sugar levels can be controlled and the patient's quality of life can be achieved optimally(22).

Motivation is also a factor in carrying out optimal self-care. Motivation can increase patient involvement in carrying out self-care such as physical activity, medication management and others because motivation

can encourage patients to maintain a physically active lifestyle (23). Motivation is an important variable that significantly influences diabetes self-care, especially in terms of diet and monitoring blood sugar levels. Respondents who have a high level of motivation will show a high frequency of maintaining their diet and monitoring blood sugar levels(24).

CONCLUSIONS AND RECOMENDATION

Researchers use self-care monitoring sheets to monitor the independence of diabetes mellitus patients at home. Monitoring for 3 months which includes monitoring physical activity, monitoring blood sugar levels, monitoring diet, and monitoring taking medication. monitoring is carried out by nurses. our next research will make applications using android in monitoring self-care at home.

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