Effectiveness of Variations of Diabetes Self-Management Education (DSME) on Self Care Behavior in Type-2 Diabetes Mellitus Patients in Tengku Chik Ditiro Hospital

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ABSTRACT

Background: Type 2 diabetes is one that is caused by an unhealthy lifestyle. such as too much sugar consumption and lack of activity. The purpose of this study was to analyze the effectiveness of variations in Diabetes Self-Management Education (DSME) on self-care behavior in Type 2 DM patients at Tengku Chik Ditiro Hospital.

Subjects and Method: The type of research conducted in this study was a quasi-experimental pretest-posttest with controls. This research was conducted at Tengku Chik Ditiro Hospital, Aceh from February to August 2021. The study consisted of 3 groups, namely the control group, the group given DSME intervention, and the DSME variation group. The research was carried out in the sample in this study as many as 45 people with the provisions in each group 1:1:1 where each group there were 15 people. This study measures self care behavior before and after being given DSME. Data analysis was carried out using another paired-test and annova test.

Results: After the intervention, the mean value of self-care behavior in the control group (Mean= 46.26; SD= 5.0), was higher than before (Mean= 43.33; SD= 8.24) but not statistically significant (p= 0.959), in the group. DSME (Mean= 66.67; SD= 5.77) was higher than before (Mean= 43.06; SD= 7.05), and statistically significant (p< 0.001), and in the variation group DSME (Mean= 68.46; SD= 6.92) was higher compared before (Mean= 44.7; SD= 8.72), and statistically significant (p< 0.001).

Conclusion: DSME activities can help increase the ability of diabetic patients to carry out self-care behavior independently.

Keywords: diabetes self management education, ankle brachial index, patient

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BACKGROUND

Diabetes Mellitus (DM) is a chronic condition that occurs when there is an increase in blood glucose levels (Al-Goblan, 2014). This can be caused by hormonal disturbances in the body or the body cannot produce insulin or use insulin effectively. Currently Type 2 Diabetes is a non-communicable disease that is becoming a trend in society (Mukhtar et al., 2020). Many factors are the cause of DM, one of which is an unhealthy lifestyle such as the habit of frequently consuming sugar and lack of activity. In the end insulin function is disrupted as a result insulin cannot work optimally so that blood sugar levels rise and insulin resistance occurs. This

condition can cause various other diseases such as the kidneys, eyes, blood vessels and also the nerves (Sears & Perry, 2015).

The 2015 IDF Atlas stated that there were 415 adults suffering from DM, in 2040 it is predicted that it will reach 642 million people (Atlas, 2015). Currently, Indonesia is also critical of "diabetes" and the WHO itself will predict that in 2030 it will be ranked second after India (Amra, 2018). The results of the Riskesdas stated that there was an increase in prevalence from 6.9% in 2013 and in 2018 it increased to 8.5% (Ministry of Health, 2018). Diabetes mellitus that is not handled properly and appropriately can cause various kinds of complications that can lead to death (Adi, 2015).

One of the education programs that must be given to people with diabetes is Diabetes Self-Management Education (DMSE). This education is a process that facilitates self-care knowledge, skills and abilities (Yulianti, 2017). People with DM, especially type 2, must do self-management. The results of research conducted by Indrayana stated that DSME with support was able to increase self-efficacy in patients with type 2 DM (Indrayana, 2016). One study explains that educational interventions affect knowledge, physical activity, food intake, self-efficacy, and health literacy (Aschner, 2017). (DSME) plays a key role in empowering people with diabetes to engage in and sustain lifestyle changes, which have been shown to improve health outcomes (de Melo Ghisi et al., 2020). DSME is the process of facilitating the knowledge, attitudes, and abilities necessary for self-management. In addition, DSME plays an important role in influencing the self-care practice of patients with diabetes mellitus (Widyanata & Arifin, 2019).

Prevention of DM complications can be indicated by the patient's habits or behavior to protect himself (self-care) (Ausili et al., 2017), the patient's belief in being able to survive (self-efficacy) (Katuuk and Kallo, 2019), assessment of the Ankle Brachial Index (ABI) value) and stable blood sugar levels (Fatmasari et al., 2019).

Currently DSME training can be carried out in various ways, the conventional way is to do face-to-face meetings directly, this method would be better if the sufferer was also accompanied by a companion such as an application on a smartphone. Smartphones have become an important communication tool globally, technological advances are increasingly increasing the reliability of smartphones in various uses (Maniam & Dhillon, 2015). Mobile apps are tools that provide a variety of functions and services ranging from entertainment, business, education and self-management, including incorporation into the management and prevention of chronic diseases such as diabetes self-care. Currently the development of health towards science and technology and technology is growing and many android applications are made to improve the health of diabetic patients (Izahar et al., 2017).

Self-care is a planned individual action in order to control the disease to maintain and improve their health and welfare status (Ishak, Yusoff, Rahman, & Kadir, 2017). Self-care is often defined as self-management in DM patients. Diabetes self-care is a program that must be carried out throughout life and is the full responsibility of DM patients (Jannoo & Khan, 2019). Self-care behavior in this study consisted of: diet regulation, physical exercise, blood sugar monitoring, medication and foot care.

In its implementation, DSME can be accompanied by an Android health application that makes it easier for patients to access information anywhere and anytime independently (Alcántara-Aragón, 2019).

The use of health applications in helping diabetes self-management of DM sufferers is still largely unutilized. Health applications will help a lot, especially in the current state of the covid pandemic where social distancing occurs. Even though social distancing is happening at this time, it doesn't hinder the spread of health information that can help diabetes patients to care for themselves independently.

Based on data from the Tengku Chik Ditiro Hospital, Pidie Regency in 2018 there were 890 cases, and now it has reached 1232 cases in 2019. This needs to be done by Diabetes Self-Management Education (DMSE) which is also varied with android applications in dealing with pandemic situations in increasing independence DM patients. The purpose of this study is to analyze the effectiveness of variations in Self-Management Education (DMSE) on self-care behavior in Type 2 DM patients at Tengku Chik Ditiro Hospital.

SUBJECTS AND METHOD

1. Study Design
The type of research conducted in this study was a quasi-experimental pretest-posttest with controls. This study consisted of three groups, namely the first group was the control group (without treatment), the second group was given DSME, and the third group was given DSME with variations in the use of the "diabetic friend" application which can be downloaded on a smartphone. The research was carried out at Tengku Chik Ditiro Hospital from February to August 2021.

2. Population and Sample
The sample in this study was 45 people with the provisions in each group 1:1:1 where each group there were 15 people. The sampling technique used is purposive sampling with the criteria that the patient has been diagnosed with type 2 DM at least 1 year old, 45-60 years old, can carry out independent activities, can read and has a smartphone.

3. Study Variables
The dependent variable is BI's self care behavior. The independent variables are DSME and Variation of DSME.

4. Operational Definition of Variables
Conventional DSME Training is DSME Training by providing face-to-face training to diabetic patients.

DSME Variation Training is DSME Training by introducing an android application that can monitor the development of diabetics independently.

Self-Care Behavior is an assessment of the behavior of diabetics to be able to protect themselves independently to prevent complications

5. Instruments
Measurement of self-care behavior is done by giving questionnaires to patients with 12 questions consisting of 4 questions about eating patterns, 2 questions about activity patterns, measuring blood sugar and 4 patterns of foot care.

6. Data Analysis
Effectiveness of treatment was measured by effect size. The mean difference between experimental and control groups was tested by independent t test. Analysis of the data used is the Kolmogorof Smirnof test to see the normality of the data in each group. The test results obtained that all data obtained p value> 0.05 so it was concluded that all data were normal. Therefore, the statistical test used is a parametric statistical test, including the paired-test and the annova test.

7. Research Ethics
This research is also equipped with basic research principles with consideration of health ethics at Prima Indonesia University with the number: 009/KEPK/UNPRI/2021.

RESULTS

1. Sanple Characteristic

The general description of the sample in this study consisted of age and gender. Based on Table 1, it was found that the majority of the sample in the control group aged 45-50 years were 7 people (46.7%), while in the DSME and DSEM variations the majority were also aged between 45-50 years, each as many as 5 people (33.3%) and 7 people (46.7%) (see Table 1).

Table 1. Frequency Distribution of Respondents' Characteristics by Age and Gender in Tengku Chik Ditiro Hospital.

Variable	Category	Control		DSME		Variation of DSME	
		n	%	n	%	n	%
Age	45-50 years	7	46.7	5	33.3	7	46.7
	51-55 years	6	40.0	7	46.7	7	46.7
	55-60 years	2	13.3	3	20.0	1	6.7
Gender	male	10	66.7	9	60.0	7	46.7
	female	5	33.3	6	40.0	8	53.3

Table 2. Differences in Self Care Behavior Values Before and After Treatment in each group (Paired T-Test)

Variable	Mean	SD	p
Pre-Intervention			
Control	43.33	8.24	0.451
DSME	43.06	7.05	
Variation of DSME	44.73	8.72	
Post Intervention			
Control	46.26	5.07	<0.039
DSME	66.67	5.77	<0.001
Variation of DSME	68.46	6.92	<0.001

Table 2 shows the results of the bivariate analysis on the control group, DSME, and DSME variants. In the control group, it was obtained (p = 0.039), while in the DSME group and variations in DSME (p < 0.001), which means that there were differences in the value of self care behavior before and after DSME was carried out and variations in DSME in DM patients (see Table 2).

Table 3. Differences in Self Care Behavior in Each Treatment Group (Annova Test)

Self-care Behavior	Mean	SD	Control	DSME	Variation of DSME
Control	2.93	1.29	-	<0.001	0.959
DSME	23.60	9.01	<0.001	-	<0.001
Variation of DSME	23.73	6.66	<0.001	0.959	<0.001

The difference in the increase in the value of self-care behavior in the three treatments was carried out using the One-Way Anova test, the results obtained that the average increase in the value of self-care behavior in the control group (Mean= 2.93; SD= 1.29), in the DSME group (Mean = 23.60; SD= 9.01), DSME variation (Mean= 23.73; SD= 6.66).

DISCUSSION

1. Differences in Self Care Behavior Values in DM Patients before and After DSME

The continuous education process to increase knowledge, ability and skills to be independent in Diabetes patients is called DSME (Diabetes Self Management Education). DSME is very necessary for diabetics to carry out self-care, this education is a form of strategy in improving a person's health status so that they can maintain or optimize their health even though they are sick. This DSME aims to optimize metabolic control and quality of life of patients in an effort to prevent acute and chronic complications, while reducing the use of clinical care costs (Norris, 2002).

The results showed that there was a significant effectiveness of DSME to DM patients in improving self-care behavior with p value <0.001. The value of self-care behavior that is increasing is an indicator of the independence of TB patients to be able to protect themselves from the risk of other diseases due to DM by means of healthy behavior such as regulating diet, increasing physical activity training, controlling blood sugar levels more regularly both independently and through services. basic level health such as puskesmas and also more regularly perform foot care such as always maintaining foot health and routinely doing foot exercises so that blood circulation around the feet is smooth. The 2019 Fikadu study stated that there was a significant difference in the average diabetes knowledge score in the group given DSME (p = 0.044). Self-care behavior as measured by diet, exercise, glucose self-monitoring, foot care, smoking, alcohol consumption showed significant differences after following DSME (p= 0.027). The group following the DSME also significantly followed certain

dietary recommendations (p=0.019) and foot care (0.009).

In the research process, diabetics who have been determined based on the research criteria will be given DSME education or training by health workers who already have the ability and experience in providing education and DM management. The things taught include basic knowledge about diabetes including definition, basic pathophysiology, reasons for treatment and complications of diabetes. Education on proper drug use, nutrition education such as diet management, calorie needs, meal schedules, weight control and so on. Foot care is also trained in this DSME activity such as doing foot exercises and how to prevent complications in the feet, because the feet are very susceptible to ulcers in DM patients. DSME activities are not carried out by researchers themselves but are carried out by a team that has been formed by researchers, so that in carrying out activities it can be controlled properly and handled by experts in their fields.

According to Blum's theory, a person's health is influenced by four factors, namely heredity, environment, health care and behavior. The environment is the biggest factor influencing behavior, and vice versa behavior can affect the environment. Behavior is the second largest factor after environmental factors that affect the health of individuals, groups or communities. Basically, changes in human behavior can change by increasing knowledge in humans so that it creates awareness, willingness and ability to carry out health behaviors.

2. Differences in ABI in DM Patients before and After Variation of DSME

In the treatment of DSME variations in this study, DSME activities were added with features or applications about diabetes found on smart phones. The application used

in this study is the "diabetes friend" application. The features of this android application that support DSME include information about diabetes, self care activities, sugar control diaries, dietary patterns for sufferers and treatment methods. The use of online media aims to make it easier for sufferers to access what they need quickly and precisely (Luawo, Sjattar, Bahar, Yusuf, & Irwan, 2019). In this application, patients can independently find info about diabetes and healthy behavior for people with DM. The results of the field show that the subjects were aware of the application for the first time as a companion in finding diabetes information and also being able to write down information about blood sugar levels being checked continuously. Indeed, there are obstacles in introducing this application to DM sufferers considering that the respondents in this study were at the age of 45 years and over.

The results showed that there was an effective variation of DSME by increasing self-care behavior in DM patients with a significance value of p< 0.001. The average results of self-care behavior before and after the variation of DSME have increased, meaning that there is an increase in self-care behavior of DM patients and variations of DSME are effective in improving the behavior of DM patients. The results of this study are in accordance with research conducted by Galih which showed that there were significant differences in self-care behavior between the treatment and control groups with p<0.001 and could be used as one of the hospital's considerations in preparing discharge planning using the DSME concept.

Currently the development of technology is getting faster and plays a role in various fields, including the health sector. Utilization of current technology can be used as a companion and can even be deve-

loped as a system that replaces the role of an expert in the field of health (Mendiola, 2015). Based on the results of the research, the "diabetic friend" application contained in an Android smartphone is very interesting because it is designed to be efficient for use and with this application it can be used as a medium to add and remind sufferers of various information about diabetes, because the site can help patients identify the development of health conditions. they. The application contains various features such as knowledge features and also recording features so that people with DM can easily control their condition. DSME is one of the fundamental elements of a comprehensive treatment plan for patients, which ultimately aims to have a positive impact on diabetics, therefore health applications on smartphones must contain educational elements because they help increase awareness of the importance of adherence and healthy behavior (Izahar et al., 2017).

3. The Effectiveness of DSME and DSME Variations in Improving Self Care Behavior

The results showed that DSME and variations of DSME had the same effectiveness in increasing self care behavior in type 2 DM patients at Tengku Chik Ditiro Hospital in 2021 with p value = 0.959. Based on the average value, there was an increase of 23.60 in DSME and an increase of 23.73 mmHg in the DSME variation, although the results showed that the increase was 0.13 in the DSME variation but it was not statistically significant.

Research conducted by Martin in 2018 stated that the use of health-based mobile media showed greater effectiveness in independently monitoring the lifestyle behavior of diabetics compared to the paper-based group (Wang, Cai, Padhye, Orlander, & Zare, 2018). Research conducted by Lari, et al in 2018 stated that providing

education using electronic media, namely CDs or in the form of SMS, could significantly increase selc effacy. Research in China states that the use of diabetes applications on smartphones in facilitating self-management of diabetic patients (Nie, Xie, Yang, & Shan, 2016).

One of the pillars of DM management is education. Education plays an important role in the management of type 2 DM because providing health education to patients can help change patient behavior in managing DM independently. DSME is one part of health promotion and is a form of community empowerment process to be able to help themselves. This program is an effective program to enable DM patients to maintain their health independently. In this study, both DSME and variations of DSME had the same effectiveness in improving the ability of DM patients compared to DM patients in the control group. The results showed that there was an increase in self-care behavior in the control group, which was only 2.93, while the group that followed DSME had a higher increase in self-care behavior.

DSME activities accompanied by additional media will accelerate the goal of community empowerment. Today's technological development will be more and more and continue to experience many rapid changes so that it can be used as a medium to help the community to be able to take advantage of the convenience applications produced by this technology. One of them is an application that helps DM sufferers based on Android so that it is considered to provide convenience and benefits for DM sufferers to study and monitor their health status independently. Therefore, the current Android smartphone makes it possible to be used as a medium of socialization, especially for increasing community empowerment.

AUTHOR CONTRIBUTION

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CONFLICT OF INTEREST
There is no conflict of interest in this study.

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