

Effect of Diabetes Self Management Education on Fasting Blood Glucose on Type 2 Diabetes

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Abstract

Diabetes Mellitus is a metabolic disease that can increase mortality and morbidity rates. Indonesia ranks 4th in the world with the most Type 2 DM, which is 21.3 million. Education of patients with Type 2 DM is a treatment that aims to make patients behave in a healthy manner so that good glycemic control is achieved. The purpose of the study was to analyze the effect of Diabetes Self Management Education on the value of fasting blood glucose in Type 2 DM patients at Telaga Murni Health Center, West Cikarang. Quasy Experiment research method with pre-experimental one group Pretest-Posttest design. Sample 44, selected using purposive sampling. Respondents were given an intervention for 4 weeks by checking blood glucose before and after the intervention. The results of the analysis showed that there was a decrease in the average blood glucose before and after the intervention, which was 27.8 mg/dl. The Wilcoxon test analysis revealed that the p value was 0.000 (<0.05), which means that there was an effect of giving DSME on the fasting blood glucose value. It is hoped that there will be maximization of education for Type 2 DM patients to increase awareness, knowledge and skills in managing their disease.

Keywords

diabetes mellitus; DSME; blood glucose



I. Introduction

Diabetes Mellitus is a metabolic disease characterized by increased levels of glucose in the blood (hyperglycemia) as a result of disruptions in insulin production, insulin performance, or both (PERKENI, 2019).

The global incidence of diabetes mellitus in 2019 according to the International Diabetes Federation Diabetes Atlas, it is estimated that 9.3% (463 million people) will increase to 10.2% (578 million people) by 2030 and 10.9% (700 million) in 2030. 2045 (Saedi, et al, 2019). Based on INFODATIN ministry of health (2018), Indonesia ranks 4th in the world with the largest number of Type 2 DM, which is 21.3 million. Riskesdas data in 2018, recorded the incidence of Type 2 DM in Indonesia increased from 6.9% in 2013 to 8.5% in 2018. Various regions in Indonesia have a high prevalence of Type 2 DM, including Bekasi Regency. West Cikarang District is one of the areas in Bekasi Regency that has a high prevalence of DM, which is 6,852 cases in 2019, of which 90% are Type 2 DM. (Data of PTM Puskesmas Telaga Murni,2020).

The increased prevalence of type 2 DM is a global health problem that has an impact on the increased risk of morbidity and mortality. The International Diabetes Federation (2020) states that uncontrolled Type 2 DM can cause complications. Complications occur due to continued increases in blood sugar levels and unstable conditions, so that it can interfere with the function of organs including the heart, blood vessels, eyes kidneys, nerves and teeth.

Type 2 DM governance is necessary for both short- and long-term purposes, so as to improve quality of life, reduce the risk of acute complications, prevent and inhibit the progressivity of chromangiopathy and macroangiopathy refiners and decrease dm morbidity and mortality. The procedures of Type 2 DM patients include providing education about Type 2 DM disease, physical/physical exercise, medical nutrition therapy (TNM), pharmacological therapy and sugar monitoring blood (PERKEN, 2019).

Diabetes Mellitus Type 2 is a disease experienced by people with lifelong people who need continuous treatment of the disease. Therefore, disease management efforts are needed, including self-care management in the form of behavior changes (changes behavior) as an effort to control blood sugar. Kusnanto (2012) mentions that blood sugar control is the main key in the prevention of complications. The results of research on patients at Banda Aceh City Hospital showed that Self Management Diabetes has an association with blood sugar levels (Mulyani, 2016).

Blood sugar level is the amount of glucose contained in blood plasma. Blood glucose levels are regulated in such a way that they can meet the needs of the body. In diabetes mellitus, the pancreas does not produce enough insulin or cannot use the resulting in difficulty. Diabetes Mellitus is enforced based on the results of blood glucose examination conducted through enzymatic examination with plasma material in venous blood. Some factors that affect blood glucose levels include physical activity, food, drug use, stress, age, BMI and gender (ADA, 2018; Novitha, 2019, Brown Adam, 2018).

Stable blood glucose levels in Type 2 DM can be achieved if the patient has the right knowledge, attitudes, behaviors and skills about the management of Type 2 DM. This can be obtained by patients through educational procedures to patients about the 5 pillars of Type 2 DM management, including providing explanations and understanding to patients about Type 2DM, physical exercise, dietary regulation, treatment, and monitoring of blood glucose levels (PERKENI, 2019). The American Diabetes Association (ADA) recommends type 2 DM patients can resist self-care efforts (Amelia, et al., 2016). Self Care Management efforts can be done by providing stimulation by means of education, counseling, and skills through the intervention of my perila related to the management of DM Type 2 patients, namely by providing Self Management Education program (Kisokanth, et al, 2013).

Diabetes Self Management Education (DSME) is a process of providing ongoing education on the application of self-care strategies in diabetes mellitus that is carried out in an effort to facilitate the ability, knowledge and skills of DM patients so that metabolic control can be achieved optimally, complications can be achieved. prevented, and the patient's quality of life can be improved (Nuradhayani, 2017). The implementation of DSME can be done in 4 sessions with a duration of 1-2 hours for each session, where the material provided includes providing a basic understanding of the diabetes mellitus test in the first session, explaining about dietary regulation and monitoring blood sugar in the second session, discussing the importance of physical/physical exercise and exercise, as well as foot care for people with DM in the third session, and discussing emotional stress and stress management, psychosocial support, and health care system facilities for people with DM for the fourth session (Chester, et al, 2018; Yuanita, 2013).

Research conducted by Bekele, et al (2020) concluded that DSME interventions can effectively impact glycemic control of Type 2 DM patients. DSME can provide diabetic patients with knowledge, problem-solving skills, decision-making skills, resource utilization, and self-care activities. A number of studies have also been conducted to demonstrate the effectiveness of self-management education in DM patients through educational efforts. Research conducted by Funneli et al (2010) found that self-management education helps patients make decisions about their treatment.

While Pimouguent et al (2011) from the results of his research mentioned that self-management education programs in diabetic patients can improve glycemic control compared to regular treatments. According to PERKENI (2019), edukasi is one of the most important diabetes management, and must be implemented comprehensively in an effort to increase motivation so that healthy behaviors can be realized from diabetes. According to research conducted by Dinar, et al (2019) on 61 respondents with Type 2 DM who were given educational interventions obtained the result that the scale of diabetes self-care increased significantly after intervention. Diabetes mellitus is a chronic metabolic disorder due to insulin deficiency or due to peripheral tissue resistance to insulin action (Yeni, 2020). The parameters used are HbA1c (p value 0.001) and Trigiserida (p value 0.04) which decrease in value. Another study conducted by Zheng Fan, et al (2019) obtained the result that the Type 2 DM education program as many as 2 sessions can effectively improve the level of self-care management of Type 2 DM patients in the intervention group with a value of < 0.01 . Based on data from the pure lake health center report on non-communicable diseases, until December 2020 there were 1,863 cases of Diabetes Mellitus, and during 2020, there were 225 people recorded for treatment during 2020 of which 95% (213 people) were Type 2 DM. And 5% (12 people) are Type 1 DM. Educational activities become one of the management programs of Diabetes Mellitus at Telaga Murni Health Center, but education is given to each patient along with control activities in puskesmas. Patients who come are elderly groups only, and for posbindu PTM has not been specifically formed so that services and coaching in diabetic patients in the adult age group are still not yet affordable. Sihombing (2020) state that Covid-19 pandemic caused everyone to behave beyond normal limits as usual. The outbreak of this virus has an impact especially on the economy of a nation and Globally (Ningrum, 2020). The problems posed by the Covid-19 pandemic which have become a global problem have the potential to trigger a new social order or reconstruction (Bara, 2021). In addition, since the covid-19 pandemic, activities held by health centers in posbindu have not been carried out because they prevent the risk of the impact of covid-19 on elderly patients, especially in Diabetes Mellitus patients so that all activities including education are carried out during patient visits to the health center. Based on the background above, researchers are interested in conducting research on the Influence of Diabetes Self Management Education (DSME) on fasting blood glucose values in Type 2 Diabetes Mellitus Patients at Telaga Murni Cikarang Barat Bekasi Health Center in 2021.

The World Health Organization (WHO) formulates that Diabetes Mellitus is a set of anatomic and chemical problems resulting from a number of factors where deficiency from insulin is absolute or relative to impaired insulin function. (World Health Organization, 2020).

II. Research Methods

This type of research is an experimental Quasy study with pre-experimental one group Pretest-Posttest design. The population in this study was a Type 2 DM patient who was recorded for treatment in 2020 in the working area of Telaga Murni health center, which is as many as 213 people, with the number of samples obtained 44 people. The sample was selected using the Purposive sampling technique, with inclusions including the age of < 50 years, having WhatsApp communication media, being able to perform independent activities, not Experiencing cognitive disorders and psychological stress.

The research was conducted over 5 weeks, and coordination was conducted through the WhatsApp group. Activities carried out include measuring fasting blood sugar in the first week, then continuing the provision of materials using Google Meet the next day of the first week, until Week four. A second blood sugar measurement was taken at week five.

III. Discussion

3.1 Results

The results of this study displayed the demographic characteristics of respondents, including age, gender, and BMI data as well as fasting blood glucose values before and after dsme intervention for 4 years week, which will be displayed in the form of univariate and bivariate analysis.

Table 1. Distribution of Age Characteristics of Type 2 Diabetes Mellitus Respondents at the Center of Pure Lake Cikarang Barat Bekasi in 2021 (n = 44)

Variable	N	Mean	SD	Min	Max
Age	44	46.25	2,829	38	49

Source: Primary Data of 2021

Based on table 1 it can be known that the age of the respondents of Diabetes Mellitus Type 2 puskesmas Telaga Murni Cikarang Barat youngest 38 years and oldest age 49 years.

Table 2. Distribution of Gender Characteristics of Diabetes Mellitus Type 2 Respondents at the Center of Pure Lake Cikarang Barat Bekasi in 2021 (n = 44)

Gender	Frequency	Percentage (%)
Man	14	31.8
Woman	30	68.2
Total	44	100

Source: Primary Data of 2021

Based on table 2 it can be known that the gender of the respondents is mostly female, which is 30 people (68.2%). While respondents with a male gender as many as 14 people (31.8%).

Table 3. Distribution of Body Mass Index characteristics of Type 2 Diabetes Mellitus Respondents at Telaga Murni Cikarang Barat Bekasi Health Center in 2021 (n = 44)

Gender	Frequency	Percentage (%)
Usual	19	43
Abnormal	25	57
Total	44	100

Source: Primary Data of 2021

Based on table 3 it can be known that respondents with an abnormal Body Mass Index more than respondents who have a normal body Mass Index, which is as many as 25 people (57%).

Table 4. Distribution of Fasting Blood Sugar before and after Intervention Diabetes Self Management Education in Respondents of Diabetes Mellitus Type 2 At Puskesmas Telaga Murni Cikarang Barat Bekasi Year 2021 (n = 44)

Variable	n	Mean	SD	Min	Max
Before	44	225,0000	79.29	100	358
After	44	197,1591	64.50	97	311

Source: Primary Data of 2021

Based on table 4, it is known that the average fasting blood sugar level in respondents before being given DSME intervention was 225.00 mg / dl with a standard deviation of 79.2 where the lowest value is 100 and Thehighest value is 358mg/dl. While the average fasting blood sugar level after intervention was 197.16 with a standard deviation of 64.50where the lowest value was 97 mg / dl and the highest value was 311 mg / dl.

Table 5. Analysis of the Influence of Diabetes Self Management *Education* (DSME) Intervention on the Blood Sugar Value of Fasting Patients DM Type 2 in Puskesmas Telaga Murni Cikarang Barat Bekasi Year 2021 (n = 44)

Variable	Mean	Min	Max	Z	Value P
Before	225,000	100,0	358,00	-	0,00
After	197,159	97,00	311,00	4,921	0

Source: Primary Data of 2021

Based on table 5 it can be known that the average fasting blood sugar level value after being given DSME intervention is lower than before. Analysis in this study was conducted usin the Wilcoxon test because the distributed data is not normal. The results of the analysis showed a significance value of 0.000 (<0.05). So, it can be said that rejected and stated that the administration of DSME interventions affects the fasting blood glucose level value of Type 2 DM patients. So, it can be said that the administration of DSME intervention effectively lowers the Blood Sugar Level Value of Type 2 DM patients.

3.2 Discussion

Diabetes Self Management Education (DSME) is an ongoing process of providing education on the application of self-care strategies in diabetes melitus conducted in an effort to facilitate the ability, knowledge and skills of DM patients so that metabolic control can be achieved optimally, complications can be prevented, and the patient's quality of life can be improved (Nuradhayani, 2017). DSME is an educational provision for Type 2 DM patients in order to perform self-care skills, so that good glikemic control can be achieved (Kisokanth, *et al*, 2013).

Diabetes Mellitus is a set of anatomic and chemical problems resulting from a number of factors where deficiency of insulin is absolute or relative to impaired insulin function (*World Health Organization*, 2020). Diabetes Mellitus is characterized by increased levels of glucose in the blood (hyperglycemia) as a result of the presence of insulin abnormalities, the work of insulin or both. An elevated and uncontrolled state of blood glucose can result in a variety of complications, both acute and chronic complications (Decroli, 2019).

One of the problems in Type 2 DM patients is a lack of knowledge and good self-management, and this will have an impact on increasing blood glucose levels. (Fatkhour Rahman, 2019). This becomes a tenting thing for Type 2 DM patients to get the right education. Education in patients with Diabetes Mellitus is one of the main pillars of type 2 DM patient management that aims so that patients can have good independent care management behavior so that stable blood glucose levels are achieved. DSME is an educational program and processes facilitating the knowledge, skills, and abilities necessary for the ongoing self-care of diabetes by patients, and these activities have been shown to provide positive outcomes in the United States. Patient health DM Type 2 (Powers, *et all*, 2015). The educational model in DSME emphasizes the active role of TYPE 2 DM patients

in extracting information and discussion, and patients are expected to decide on the best course of action to improve their health, after participating in educational activities (Haas, et al., 2014).

In this study, educational interventions conducted for Type 2 DM patients consisted of 4 meetings with four topics. Among them are education about understanding the concept of Diabetes Mellitus and the use of diabetes drugs Mellitus, maintaining diet and monitoring blood sugar, doing physical exercise and treatment foot and stress management and utilization of access to health services. Based on data analysis, it is known that there is an increase in knowledge before and after intervention, where good knowledge increases from 23% to 34% after intervention, where of the 37 people (84%) patients with decreased blood sugar scores, 20 (54%) experienced an increase in knowledge scores. While the participants' poor knowledge decreased from 16% to 9%.

After an analysis of dsme educational interventions, it was found that the average score of blood sugar before the intervention was 225.000 mg / dl and after the intervention was 197.1591 mg / dl with an average decrease of 27.8409 mg/dl. The *Wilcoxon test* resulted in a z test statistic of -4,921 with a significance value of 0.000. This indicates that the significance value is less than $\alpha = 0.05$. Therefore, it can be stated not rejected and there is a significant effect of the administration of DSME intervention on the fasting blood glucose value of type 2 DM patients. And it can be interpreted that the administration of DSME intervention effectively lowers the Blood Glucose Value of DM Type 2 patients.

A study conducted by Yuan, *et al* (2014), on 88 patients with Type 2 DM given DSME intervention, mentioned that the educational activities have an influence on glycemic control. As seen from the decrease in the value of HbA1c. Another study conducted by Cabello, *et al* (2014) also mentioned that the provision of education about the self-management of diabetes mellitus has a positive influence on improving self-care behavior and this will ultimately improve glycemic control status.

Another study conducted by Kristianti (2016), on 52 prediabetes patients, obtained the results that DSME intervention for 3 weeks with 3 meetings can affect improvement of knowledge (p value 0.03) and decreased fasting blood sugar (p value 0.00) in the intervention group. This is also the same as Kurniawati's study (2017) which provided DSME *Diabetes* intervention in Type 2 DM patients, where the average value of fasting blood sugar levels in respondents after being given DSME decreased by 142.82.

V. Conclusion

Based on the researcher's analysis of the results of the study and supported by the results of previous studies, the researchers assumed that the administration of DSME interventions in Type 2 DM patients could provide knowledge to patients so that they can recognize and apply diabetes treatment strategies independently so as to lower blood sugar levels that are expected to achieve glycemic control Good, prevent complications and improve the quality of life of Type 2 DM patients.

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