

Original Research Article

THE EFFECT OF DIABETES SELF MANAGEMENT EDUCATION (DSME) ON SELF EFFICACY IN TYPE II DIABETES MELLITUS PATIENTS

Mohammad Subkhan¹, Firman Firman^{2*}, Ida Agustini^{2,3}

¹ Department of Medicine, Faculty of Medicine, University of Muhammadiyah Surabaya

² Department of Medical Surgical Nursing, Faculty of Medicine, University of Muhammadiyah Surabaya

³ Department of Nursing, Siti Khadijah Hospital, Sepanjang Sidoarjo

*Correspondence:

Firman Firman

Department of Medical Surgical Nursing, Faculty of Medicine, University of Muhammadiyah Surabaya Raya Sutorejo No.59, Surabaya, East Java, 60113

Email: firman@um-surabaya.ac.id

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Abstract

Background: Diabetes mellitus (DM) is a health problem in the world. Currently, the number of DM cases globally has reached 537 million people, and Indonesia ranks fifth highest in the world. Low knowledge and dietary compliance are a problem that continues to contribute to new cases and relapses of old cases characterized by uncontrolled increases in blood sugar. This is caused by low self-efficacy which is characterized by feelings of hopelessness.

Objectives: The aim of this research was to determine the effect of Diabetes Self-Management Education (DSME) on self-efficacy in type II Diabetes Mellitus patients.

Methods: This study used a Quasy-experimental design, with a pretest posttest equivalent control group design, the sample size was 68 type II DM patients, consisting of 34 intervention groups and 34 control groups. Self-efficacy data was collected using the DMSES (Diabetes Management Self Efficacy Scale) questionnaire. Univariate analysis was used to describe the frequency distribution of respondents, mean, median and standard deviation. Next, bivariate analysis used the Wilcoxon test.

Results: There was a significant difference in the difference in mean value self-efficacy between before and after intervention with p-value $0.000 < 0.05$.

Conclusion: *Diabetes Management Self Efficacy Scale is effective increase self-efficacy. Thus, DSME can be an alternative intervention to overcome problems and prevent complications in DM patients.*

Keywords: *Diabetes Self-Management Education, Diabetes Management Self Efficacy Scale*

INTRODUCTION

Diabetes mellitus is a chronic disease that has an impact on various aspects of life, both physical, psychological and economic (Boyko et al., 2022). People who suffer from DM (Diabetes mellitus) are characterized by an

uncontrolled increase in blood sugar, which will gradually cause health problems such as retinopathy, which causes the eyes to become blurry and the microvasculature is characterized by tingling. (Malik et al., 2022). This condition becomes worse if you do not

adhere to the recommended diet (Page-Reeves et al., 2023). Low knowledge and self-efficacy cause a person to be non-compliant with a diet. In fact, unhealthy eating patterns are the main contributor to the increase in cases of type 2 diabetes mellitus in the world (Han et al., 2022).

According to data from the IDF (International Diabetes Federation), currently the number of cases in the world has reached 537 million people, which is expected to continue to increase by 46%, namely to 643 million people in 2030, and to 783 million people in 2045. (IDF, 2021). Indonesia is in fifth place with the highest number of diabetes mellitus cases in the world reaching 19.5 million people, after China is in first place reaching 140.9 million people, then followed by India with 74.2 million people, Pakistan with 33 million people and America with 32.2 million people. The number of cases is expected to continue to increase, along with unhealthy lifestyles. Indonesia is expected to experience an increase of 28.6 million people in 2045 (WHO (World Health Organization), 2021). The same thing also happened at Siti Khadijah Panjang Hospital, where there was an increase in the number of type 2 DM cases in 2023 to 2024, reaching 438, from 2022 which was only 275 people.

The high number of diabetes mellitus cases in Indonesia is influenced by several factors, such as increased body weight or obesity (29.0%). Obesity is caused by poor eating patterns (77.4%), continuous excess nutritional intake which causes excess fat stores in the body. This fat tissue is an active endocrine tissue that releases adipose cytokines. Cytokines will interfere with the insulin signaling pathway, causing insulin resistance. Another factor, namely lack of activity (64.5%), not doing physical activity, has not been proven to increase the risk of developing type 2 DM, this is probably caused by physical activity carried out daily (such as walking to the market, hoeing, washing, gardening) not including doing activities. Physique (Dungga et al., 2024).

Confidence in the abilities of people with diabetes mellitus to be more compliant with diet and self-management in order to recover from their illness. A previous study explained that preventing complications in diabetes mellitus is by controlling blood sugar (Malik et al., 2022). Well-controlled blood sugar can reduce the risk of retinopathy (Petersen et al., 2022 ;Wan et al., 2022). Higher self-efficacy indicates good self-management, and being more compliant with treatment and tending to have a healthy lifestyle. The results of a randomized study show that there is a relationship between self-efficacy and a decrease in HBA1C (Handelsman et al., 2019). Peer learning or fellow DM patients is effective in improving better self-management (Seuring et al., 2019). The results of the review study explain that Diabetes self-management education (DSME) is effective in increasing the knowledge and behavior of diabetes mellitus patients (Camargo-Plazas et al., 2023). DSME can increase knowledge and self-care behavior (Roberta et al., 2023).

Based on several studies, improving a patient's knowledge and behavior is very important, to encourage better health, so that complications do not occur. Apart from that, previous research has not specifically explained how to increase self-efficacy and adherence to diet. Diabetes self-management education (DSME) is an intervention that provides health education about DM, education about diet, physical activity and health monitoring. (He et al., 2023).

Objective(s): The aim of this research is to determine the effectiveness of the Diabetes self-management education (DSME) intervention on self-efficacy in type II DM patients.

METHODS

Study Design

This research used a quasy experimental design, with a pretest posttest equivalent control group design with repeated measurements.

Research Subject

Participants were recruited using convenience sampling, sampling was carried out at Siti Khadijah Hospital, Sepanjang Sidoarjo, East Java, Indonesia, from February to March 2024. Respondents met the following inclusion criteria; Type II DM patients, patients visiting the internal medicine clinic, cooperative, willing to be research samples. And were excluded if their consciousness decreased, they had mental disorders and they refused to participate in this research. The total sample was 68 people, consisting of an intervention group and a control group, each group totaling 34 people.

Instruments

The first measuring tool used in this research was collecting sociodemographic data using a questionnaire including (age, gender, education level, marital status, employment, income and comorbidities). To measure self-efficacy, the DMSES (Diabetes Management Self-Efficacy Scale) questionnaire was used. Providing Diabetes Self-Management Education treatment uses the SPO Diabetes Self-Management Education (DSME) check list.

Intervention

The Diabetes Self-Management Education (DSME) intervention procedure is carried out three times every day, in the morning, after have lunch and the afternoon. which consists of three sessions, the first session provides material about diabetes mellitus, the second session was about complications and their prevention, and the third session provides reinforcement, motivation and support. Each session lasts 15-20 minutes for 7 days. Pre-test given the intervention, self-efficacy and sociodemographic were measured in the intervention group and control group. Furthermore, DSME intervention was given to the intervention group, and the control group was only given standard intervention from the

hospital. The intervention stage, starting from the preparation stage, begins with giving explain to the respondent the procedures to be carried out, maintain the respondent's privacy and create a comfortable atmosphere. Implementation stage ask the patient to lie in a supine or sitting position and relax, furthermore providing intervention with Diabetes Self-Management Education, the next is the termination or evaluation stage, and gives them the opportunity to provide feedback on the therapy that has been carried out.

Data Analysis

Data were analyzed using SPSS software (Version 25.0; Chicago IL USA), to describe data on gender, education level and marital status, self-efficacy and dietary compliance, frequency and percentage distributions were used. Meanwhile, age and blood sugar values are presented in the form of mean, median, min-max and standard deviation. For further analysis, to determine the difference in the mean pretest and posttest values because the data was not normally distributed, the Wilcoxon test was carried out with a significant value (p -value < 0.005).

Ethical Consideration

The procedures in this study involving human participants by administering the DSME intervention have been approved and declared in accordance with the ethical standards of the Health Research Ethics Committee (KEPK) of the Siti Khadijah Hospital, Sepanjang Sidoarjo, with registration number (No.018/KET-KEPK/6-2023). All participants in this study have received an explanation and expressed their willingness to sign the informed consent that was given.

RESULTS

Based on the Table 1, it showed that the characteristics of respondents according to the average age of respondents in the intervention group was 53.38 years old and the median value was 53.90 with standard deviation 6,344. The

youngest is 43 years old and the oldest is 67 years old. Meanwhile, the average age in the control group was 55.94 years and the median value was 54.50 with standard deviation 5,908. The youngest is 46 years old and the oldest is 65 years old.

Table 1. Characteristics of Respondents Based on Age

| | Group | Mean | Min-Max | Median | Std. Dev |
|------------|--------------|-------|---------|--------|----------|
| Age | Intervention | 53.38 | 43-67 | 53.90 | 6,344 |
| | Control | 55.94 | 46-65 | 54.50 | 5,908 |

The table 2 showed that the distribution of respondents based on gender characteristics in the intervention group, most of the respondents were women, 23 people (67.6%) and in the control group, the majority of respondents were also women, 19 people (55.8%). According to the educational level of respondents in the intervention group, the majority were high school, 11 people (32.4%), while in the control group, the majority were Diploma/Bachelor's degrees, 12 people (35.3%). The marital status of most respondents was married, in the intervention group 27 people (79.4%) and in the control group 23 people (67.6%). Most of the respondents were working, the intervention group was 23 people (67.6%). Meanwhile, 20 people (59.8%) worked in the control group. The income level of the intervention group was mostly income > Rp. 3,000,000 - Rp. 4,000,000, as many as 10 people (29.4%). Meanwhile, most of the control group had income < Rp. 1,000,000, as many as 9 people (26.4%). Most of the comorbid diseases experienced were hypertension, 28 people in the intervention group (83.3%), and 24 people in the control group (71.4%).

Based on the table 3, distribution *self-efficacy* Most of the respondents in the Pre-test intervention group were given the Diabetes Self-Management Education (DSME) intervention *self-efficacy* low by 25 people (73.5%). And the post-test was given the most

intervention *self-efficacy* high as many as 31 people (91.2%). Meanwhile distribution *self-efficacy* Most of the respondents in the control group had pre-test results *self-efficacy* low as many as 22 people (64.7%), and post-test most of the distribution *self-efficacy* low amounting to 24 people (70.6%).

Table 2. Characteristics of Respondents

| Variable | Intervention Group | | Control group | |
|---------------------------------|--------------------|------|---------------|------|
| | n | % | n | % |
| Gender | | | | |
| Man | 11 | 32.4 | 15 | 44.2 |
| Woman | 23 | 67.6 | 19 | 55.8 |
| Total | 34 | 100 | 34 | 100 |
| Level of education | | | | |
| Elementary school | 4 | 11.8 | 3 | 8.8 |
| Junior High School | 9 | 26.5 | 8 | 23.5 |
| Senior High School | 11 | 32.4 | 11 | 32.4 |
| Diploma/Bachelor's | 10 | 29.4 | 12 | 35.3 |
| Total | 34 | 100 | 34 | 100 |
| Marital status | | | | |
| Marry | 27 | 79.4 | 23 | 67.6 |
| Widow widower | 7 | 20.6 | 11 | 32.4 |
| Total | 34 | 100 | 34 | 100 |
| Job | | | | |
| Doesn't work | 7 | 20.6 | 12 | 35.2 |
| Work | 23 | 67.6 | 20 | 59.8 |
| Pension | 4 | 11.8 | 2 | 5.0 |
| Total | 34 | 100 | 34 | 100 |
| Income | | | | |
| < Rp. 1,000,000 | 5 | 14.8 | 9 | 26.4 |
| Rp. 1,000,000 - Rp. 2,000,000 | 3 | 8.9 | 7 | 20.6 |
| > Rp. 2,000,000 - Rp. 3,000,000 | 7 | 20.5 | 6 | 17.7 |
| > Rp. 3,000,000 - Rp. 4,000,000 | 10 | 29.4 | 4 | 11.7 |
| >4,000,000 | 9 | 26.4 | 8 | 23.6 |
| Total | 34 | 100 | 34 | 100 |
| Comorbid | | | | |
| Hypertension | 28 | 83.3 | 24 | 71.4 |
| Heart disease | 2 | 5.0 | 8 | 23.6 |
| CKD | 4 | 11.7 | 2 | 5.0 |
| Total | 34 | 100 | 34 | 100 |

Table 3. Distribution Overview *self-efficacy* Pre-test and Post-test Results

| Intervention Group | | Pre-test | | Post-test | |
|--------------------|----|----------|----|-----------|--|
| Variable | n | % | n | % | |
| Tall | 9 | 26.5 | 31 | 91.2 | |
| Low | 25 | 73.5 | 3 | 8.8 | |
| Total | 34 | 100.0 | 34 | 100.0 | |
| Control group | | Pre-test | | Post-test | |
| Variable | n | % | n | % | |
| Tall | 12 | 35.3 | 10 | 29.4 | |
| Low | 22 | 64.7 | 24 | 70.6 | |
| Total | 34 | 100.0 | 34 | 100.0 | |

From the results of the Wilcoxon analysis above, it showed that there was a significant influence on the mean self-efficacy of the intervention group. Pre-test and post-test were given the intervention *Diabetes Self-Management Education* with value (P-Value $0.000 < 0.05$). Thus, this shows that there are significant differences in the mean values *self-efficacy* in the intervention group, where the difference in change from the pre-test and corresponding was 11.50. Meanwhile, the results of the analysis in the control group showed that there was no significant influence between the mean value of self-efficacy from the pre-test and post-test results, as evidenced by the value (p-value $0.317 > 0.05$).

Table 4. Mean Difference Analysis *Self-Efficacy* Pre-test and Post-test Results

| <i>Self-efficacy</i> | Different Means | P-Value |
|---------------------------|-----------------|---------|
| Intervention Group | | |
| Pre-test - Post-test | 11.50 | 0,000* |
| Control Group | | |
| Pre-test - Post-test | 2.50 | 0.317 |

*Significant at $\alpha < 0.05$, by Wilcoxon test

DISCUSSION

The findings of this study showed that there was a significant influence on the mean self-efficacy of the intervention group. Pre-test

and post-test were given the intervention *Diabetes Self-Management Education* with value (p-value $0.000 < 0.05$) indicates that there was a significant difference in the mean value *self-efficacy* in the intervention group. Meanwhile, the results of the analysis in the control group showed that there was no significant influence between the mean value of self-efficacy from the pre-test and post-test results, as evidenced by the value (p-value $0.317 > 0.05$). Based on these results, the intervention group had an influence on increasing self-efficacy scores.

Self-efficacy is the belief that a person can carry out a certain behavior to achieve the desired goal because high self-efficacy can be influenced by several factors, such as *Diabetes Self-Management Education*. The results of this research are in line with previous research conducted by Rahmawati, (2016), because based on this research it is not only the knowledge of individuals, families and communities in efforts to control type 2 DM but also the use of health information, changes in attitudes, changes in behavior and increased compliance with treatment program and improving the quality of life of type 2 DM sufferers.

DSME can also overcome distress in type 2 DM patients ($p=0.001$), because diabetes distress refers to negative psychological reactions related to emotional stress and worry about the situation, so the effect of giving DSME to DM patients who face complex chronic diseases and stress in reducing the burden of diabetes can worsen the condition after research showed that there was an effect of giving DSME/S on reducing diabetes distress (Nurkamilah & Widayati, 2018). Clients who are facilitated with knowledge and skills in carrying out self-care for DM through providing DSME/S education, which is support-based health education in a directed and structured manner, can learn how to solve the problems experienced by DM patients. *Diabetes Self-Management Education* increases patient knowledge about independent

self-care compared to simply providing knowledge about diabetes (Murtaqib., 2019).

Diabetes Self-Management Education (DSME) is a strategy for transferring knowledge as well as raising patient enthusiasm, so that they will demonstrate healthy behavior. Diabetes is a chronic disease that requires lifelong treatment. Therefore, comprehensive treatment is required. Inappropriate care has broad implications for patients and families (Murtiningsih et al., 2021). This is because the DSME intervention group consistently adheres to the four pillars of diabetes, namely education, nutritional management, implementation of physical activity, and daily drug therapy. (Malik et al., 2022). Different from the control group intervention. In the control group intervention, the other three pillars of diabetes management were not implemented, and education was only provided about the general description of diabetes, without special monitoring of diet management or physical activity. So that the DSME intervention group experienced a decrease in blood sugar levels at any time and the control group experienced an increase in blood sugar levels at any time.

This finding is supported by research conducted by Uly, (2018), showing that there was a significant change in the mean blood glucose levels of respondents in both groups after implementing the intervention. According to Perkeni (2015), there are four main pillars in the treatment of type 2 diabetes patients: education, nutritional therapy, exercise, and pharmacology. Education plays an important role in the treatment of type 2 DM because educating diabetes patients can change their diabetes self-care behavior. According to the researchers' assumptions in this study, DSME interventions rely more on knowledge, nutritional management, physical activity, foot care, stress management, and medication use. They were compared with a control group who were only given information about non-communicable diseases. The results of this study showed that there was a significant

difference in HBA1C levels between the treatment group and the control group (Handelsman et al., 2019).

CONCLUSION

There is a significant difference in the mean value self-efficacy between before and after intervention, with value (P-Value $0.000 < 0.05$). This shows that *Diabetes Management Self Efficacy Scale* is effective increase self-efficacy. DSME is a form of intervention in health education for diabetes mellitus patients. Health education not only transfers knowledge to patients, but can also increase enthusiasm and confidence in each patient's ability to recover from the DM disease they are experiencing. Thus, DSME can be an alternative intervention to overcome problems in DM patients and prevent complications.

SUGGESTIONS

This study has several limitations, firstly, participants were not recruited randomly, this is because the number of hospitalized patients was not sufficient according to the specified number, so with these limitations the sample was determined using convenience sampling, meaning the researcher took patients who met the inclusion criteria and willing to be a participant in this research. Therefore, further research needs to be carried out by identifying and controlling possible confounding variables, including drug therapy given to participants during the research.

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DECLARATION OF CONFLICTING INTEREST

No conflict of interest

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AUTHOR CONTRIBUTION

Mohammad Subkhan: Conduct the study and collect the data.

Firman Firman: Conduct the study, analysis, translation and submit this manuscript.

Ida Agustiningsih: Conduct the study, provided access and coordinated participants.

ORCID

Mohammad Subkhan: None

Firman Firman: None

Ida Agustiningsih: None

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