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Impact of diabetes self-management education in middle-aged patients with type 2 diabetes mellitus: A systematic review

Impacto de la educación para el autocontrol de la diabetes en pacientes de mediana edad con diabetes mellitus tipo 2: una revisión sistemática

Emilia Erningwati Akoit[1a*], Ferry Efendi[2b], Yulis Setiya Dewi[3b]

SUMMARY

Introduction: *Diabetes Mellitus (DM) disease, if not treated properly, will cause various complications. Entering the age of 40 years and above, patients with DM disease begin to show progress toward the occurrence of complications. Hence, DM patients need to know about the appropriate self-management of diabetes through diabetes self-management education (DSME). This systematic review aimed to identify the effectiveness of diabetes self-management education in middle-aged patients (40-64 years) with type 2 DM.*
Methods: *The research method used was a systematic review. A literature search was conducted on data based on Scopus, Web of Science, PubMed, and EBSCO with the keyword's education, self-management, diabetes mellitus, self-care, and middle-aged. As a result, there was 15 literature that met the inclusion criteria, including type 2 DM patients, diabetes self-management educational interventions, the output is glycemic control (fasting blood sugar levels, post-prandial 2-hour blood sugar levels, and HbA1c levels), quality of life, self-efficacy, blood pressure, psychological status, and self-care behaviours.*
Results: *The results showed that the impact of diabetes self-management education on type 2 DM patients improved quality of life, controlled blood pressure, increased self-efficacy, psychological status, and self-care behaviour.*
Conclusion: *The conclusion is that interventions in the form of diabetes self-management education have a positive impact on middle-aged patients with type 2 DM, and this intervention can be applied in healthcare settings. Subsequent studies with other methods and designs of study, as well as a greater amount of literature, are strongly recommended.*

Keywords: *Education, diabetes mellitus, diabetes mellitus type 2, self-management.*

RESUMEN

Introducción: *La enfermedad de la diabetes mellitus (DM), si no es tratada adecuadamente, ocasionará diversas complicaciones. Al entrar en la edad de 40 años o más, los pacientes con enfermedad de DM comienzan a mostrar progreso hacia la aparición de complicaciones. Por lo tanto, los pacientes con DM necesitan conocer el autocontrol apropiado de la*

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ORCID ID: 0000-0002-1230-5691[1]
ORCID ID: 0000-0001-7988-9196[2]
ORCID ID: 0000-0003-4407-0433[3]

[a]Doctoral Program Student, Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia
[b]Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia

[*]Corresponding author: Emilia Erningwati Akoit
E-mail: emilia.akoit@yahoo.co.id

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diabetes a través de la educación para el autocontrol de la diabetes (DSME). Esta revisión sistemática tuvo como objetivo identificar la efectividad de la educación para el autocontrol de la diabetes en pacientes de mediana edad (40 a 64 años) con DM tipo 2.

Métodos: *El método de investigación utilizado fue una revisión sistemática. Se realizó una búsqueda bibliográfica sobre datos basados en Scopus, Web of Science, PubMed y EBSCO con las palabras clave educación, autogestión, diabetes mellitus, autocuidado y mediana edad. Como resultado, hay 15 publicaciones que cumplen con los criterios de inclusión, que incluyen pacientes con DM tipo 2, intervenciones educativas para el autocontrol de la diabetes, el resultado es el control glucémico (niveles de azúcar en sangre en ayunas, niveles de azúcar en sangre posprandiales a las 2 horas y HbA1c niveles), calidad de vida, autoeficacia, presión arterial, estado psicológico y conductas de autocuidado.*

Resultados: *Los resultados mostraron que el impacto de la educación para el autocontrol de la diabetes en pacientes con DM tipo 2 mejoró la calidad de vida, controló la presión arterial, aumentó la autoeficacia, el estado psicológico y el comportamiento de autocuidado.*

Conclusión: *La conclusión es que las intervenciones en forma de educación para el autocontrol de la diabetes tienen un impacto positivo en pacientes de mediana edad con DM tipo 2, y esta intervención puede aplicarse en entornos de atención médica. Se recomiendan estudios posteriores con otros métodos y diseños de estudio, así como una mayor cantidad de literatura.*

Palabras clave: *Educación, diabetes mellitus, diabetes mellitus tipo 2, autocuidado.*

INTRODUCTION

Diabetes Mellitus (DM) is caused by an increase in blood glucose levels over a long period and, if not treated properly, can cause various complications (1-3). Efforts to prevent complications can be made in various ways, for example, by increasing the knowledge of DM patients. Efforts to prevent complications can be made in various ways, for example, by increasing the knowledge of DM patients through education to improve the ability of patients to manage their diseases (4-7). Health workers have carried out various education, but it is felt that it is not optimal. This condition is evidenced by the data that some patients come to the service already with various complications. This condition is caused due to poor glycemic control due to low adherence to treatment and self-care behaviour (8-10). DM is also a chronic disease that requires regular treatment, so it is not uncommon to cause psychological stress in patients (11-13). It is further explained that stress affects the patient's emotions and impacts non-compliance with treatment (14).

Currently, the number of DM patients, primarily type 2 DM, is increasing rapidly (15). The number of DM people in the world for 2021 is 537 million. This number is predicted to increase to 643 million in 2030 and 783 million in 2045 (16). Type 2 DM is a direct cause of approximately 1.5 million deaths globally. Patients with type 2 DM face a much higher risk of morbidity and mortality, directly impacting the declining quality of life and productivity (17). Type 2 DM was also associated with a 3-fold increase in deaths, primarily associated with cardiovascular disease, and a 3 to 7-fold increase in the risk of coronary artery disease (15). This condition certainly significantly impacts reducing the quality of life of type 2 DM patients.

Quality of life is one of the most important factors for treatment outcomes to assess the influence of diabetes management. It is influenced by several factors, including personal expectations, attitudes, practices, and patient knowledge (18). The low quality of life of DM patients is oft en associated with the presence of DM complications. It is further explained that DM complications such as cardiovascular disease, nephropathy, renal failure, erectile dysfunction, amputations, and infections impact health and negatively influence the quality of life (19,20). Patients with DM also tend to have a poor quality of life, especially regarding physical and psychological functioning (21). Therefore, efforts to prevent complications are significant, one of which is through diabetes self-management education.

Diabetes self-management education is a diabetes support program that is a means for DM patients to get an education, support the development of patient health and shape the behaviour of diabetic patients (22). Diabetes self-management education is carried out to produce clinical changes in DM patients (controlled blood glucose levels) and changes in lifestyle and

psychosocial in type 2 DM patients (23). Another opinion explains that diabetic patients that gain sufficient knowledge through education, it is hoped, will be able to carry out self-care properly to achieve adequate glycemic control. Various complications can be minimized and prevent premature death (24). Several research results show that diabetes self-management education impacts increasing self-efficacy, decreases HbA1c levels, controlling blood pressure, and increases self-care behaviours (25-27). This condition shows that diabetes self-management education positively impacts type 2 DM patients. However, in this literature review, we want to know more deeply about the influence of diabetes self-management education, especially in middle adulthood, because considering it is at this age that the development of DM disease occurs with various microvascular complications and macrovascular. Based on the above phenomenon, a more in-depth study of the literature on the effectiveness of diabetes self-management education in middle adult patients with type 2 DM needs to be carried out. This systematic review aims to test the effectiveness of diabetes self-management education in middle-aged patients with type 2 DM. This study aimed to illustrate the effectiveness of diabetes self-management education in middle-aged patients with type 2 DM.

METHODS

Study Design

The design of this study is a systematic review. The literature used in this study is a research article that discusses diabetes self-management education and its impact on middle-aged patients with type 2 DM.

Sample Study

Inclusion criteria in this study were participants diagnosed with type 2 DM in a middle adult age range (40-64 years). Type 1 DM or other types, ages under 40 or over 65, are excluded. The interventions provided were diabetes self-management education (dietary regulation, physical activity, drug regulation, blood sugar level monitoring, and foot care) for type 2 DM patients. Other interventions that are not related to the self-management of diabetes are excluded. The main results expected in this paper are glycemic control (HbA1c levels), and secondary results are quality of life, self-efficacy, blood pressure, psychological status, and self-care behaviour. Other inappropriate outcomes, such as knowledge and attitudes, are excluded.

Search Methods for Identifying Studies

The literature search was carried out on 4 (four) data based, namely Scopus, Web of Science, PubMed, and Ebscohost (CINAHL), from 2017 to 2021. The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines are used to conduct and report on systematic reviews. The search strategy is carried out with several stages, including entering keywords to see articles relevant to the research. Next is to check the duplication between the database and output the duplicated article, then read the title and abstract. The next step is to adjust to the established inclusion and exclusion criteria. In the end, they got the full article from article and found 15 articles eligible for systematic review. The search flow chart is in Figure 1.

Study Selection

Study selection is carried out manually against articles that are for the study. Articles that do not fit the purpose of the study are issued. In the event of duplication of articles, then the duplicated articles are excluded. Furthermore, screening titles and abstracts relevant to the research objectives are carried out. In the end, there are identified articles that are ready for review.

Data Extraction

The authors filtered all abstracts identified in the initial search and issued studies that did not fit the inclusion criteria. The data extraction process is carried out by collecting data related to the author, year of publication, study design, basic sample, final size, and duration of intervention. After the data extraction process, it is reviewed again by all authors to see the accuracy of the data.

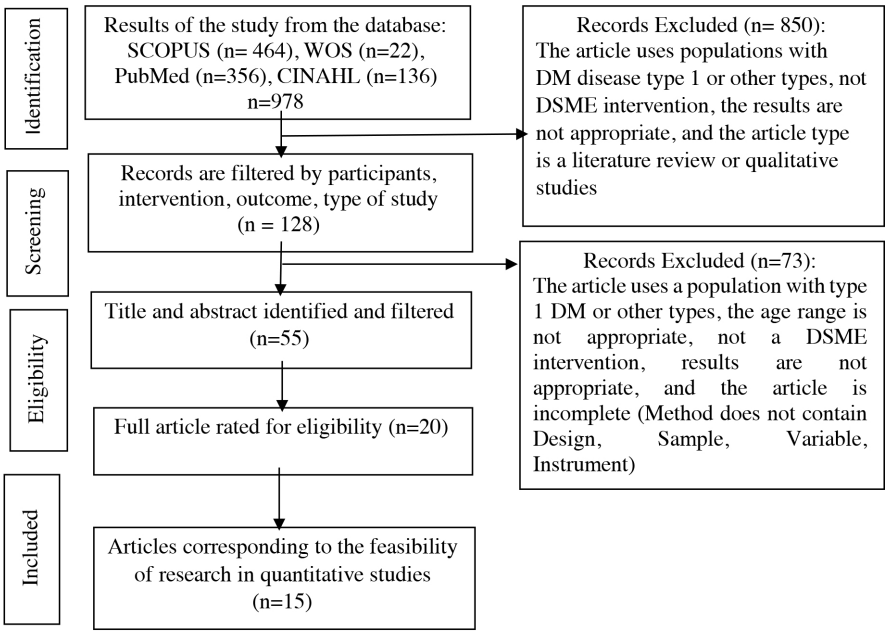

Figure 1. Flow chart of study selection.

Assessment of The Quality of The Study

The guide used to assess the quality of study methodology by reducing the risk of bias in this systematic review is Cochrane. The instrument uses specific criteria for assessment as low-risk, unclear, or high-risk across seven categories, including randomly sequenced, concealment of allocations, blinding participants and personnel, blinding result assessors, incomplete outcomes data, selective reporting of results, and other biased categories covering other areas of concern but not covered in the previous six categories.

RESULTS

The study's results are a literature review of the effectiveness of diabetes self-management education in type 2 DM patients. The results of this study are displayed following the categories that have been carried out: the effectiveness of diabetes self-management education on glycemic control, quality of life, self-efficacy, blood pressure, psychological status, and self-care behaviour. In addition, a literature study of 15 articles showed that diabetes self-management education positively affects the healthy development of type 2 DM patients.

DSME and Glycemic Control

Type 2 DM patients with poor management cause uncontrolled blood glucose levels, resulting in various complications. Glycemic control can be derived from several indicators, one of which is HbA1c levels. Several research results showed that diabetes self-management education improved the glycemic control of type 2 DM patients, where HbA1c levels decreased in the intervention group after being educated for 6 months (11). This study aims to evaluate the effectiveness of diabetes self-management education on the psychological and glycemic control of type 2 DM patients. The study involved 118 type 2 DM patients (63 intervention and 55 control group patients). The research design used is quasi-experimental.

Furthermore, the results of other studies illustrated that the decrease in HbA1c levels was greater in the group that received DSME by Japanese doctors and nurses' associations

Table 1. The Results of The Article Review.

Title, Author, Year	Research Objectives	Design	Sample	Results and Conclusions
The effect of diabetes self-management education on psychological status and blood glucose in newly diagnosed patients with diabetes type 2, (11)	Evaluating the effectiveness of diabetes self-management education on psychological outcomes and glycemic control in patients with type 2 diabetes mellitus	Quasi-experimental	118 type 2 DM patients (63 intervention/ education group patients and 55 control group patients)	There were differences in anxiety levels, depression, fasting blood sugar levels, 2-hour PP blood sugar levels, and HbA1c levels between the intervention and control groups after the intervention for six months.
Effects of physician's diabetes self-management education using Japan Association of Diabetes Education and Care Diabetes Education Card System Program and a self-monitoring of blood glucose readings analyzer in individuals with type 2 diabetes: An exploratory, open-labeled, prospective randomized clinical trial (28)	Identifying the effect of diabe-tes self-management education by doctors using educational tools on the glycemic control of type 2 DM patients in Japan	An exploratory, open-labeled, prospective ran-domized clinical trial	76 type 2 DM patients (38 intervention group patients and 38 control group patients)	HbA1c levels increased significantly in the intervention group, and there was no improvement in the control group. The decrease in HbA1c levels was more significant in the group that received the DSME of a Japanese doctor and treatment association than those who checked blood glucose levels and received insulin therapy.
Effectiveness of Diabetes Self–Management Education in Thais with type 2 Diabetes (29)	Identifying the educational effects of diabetes self-management in type 2 DM patients in Thailand	A retrospective cohort study	488 patients took the DSME, and 488 patients did not attend the DSME program	There was a similar reduction in HbA1c levels between the two groups. There was an increase in the knowledge and self-care behaviours of diabetes in the intervention group.
Effects of an Outpatient Diabetes Self-Management Education on Patients with type 2 Diabetes in China: A Randomized Controlled Trial (1)	Assess the effectiveness of diabetes self-management education programs in outpatient units.	A randomized controlled trial.	60 type 2 DM patients were divided into two groups (30 intervention group samples and 30 control group samples)	There were differences in the average SDSCA score ($p < 0.01$), dietary control (p value=, physical activity, psychological distress ($P<0.05$), foot care ($p < 0.01$), fasting blood sugar levels ($p < 0.01$), 2 hours PP ($p < 0.01$) and HbA1c levels ($p < 0.01$) in the intervention group before and after the procedure was given.
Examining elevated blood pressure and the effects of diabetes self-management education on blood pressure among a sample of Marshallese with type 2 diabetes in Arkansas (30)	Evaluated the effects of DSME on blood pressure in native Hawaiians and Pacifics.	Randomized controlled trial	221 patients with type 2 DM	There was a decrease in systolic blood pressure after the DSME intervention, and a significant decrease in diastolic blood pressure occurred six months and 12 months post-intervention.
Effect of diabetes self-management education on glycaemic control among type 2 diabetic patients at a family medicine clinic in Kenya: A randomized controlled trial (31)	Assess the educational influence of diabetes self-management compared to regular diabetes care by family doctors.	Randomised controlled clinical trial	96 patients of type 2 DM (55 patients of the DSME group) and 41 patients (ordinary group)	After six months of intervention, there was no significant difference from the main results, namely HbA1c levels between the two groups, with an average difference of 0.37. The DSME also makes no significant changes in the secondary output
Impacts of self-management education on glycaemic control in patients with type 2 diabetes mellitus (32)	Identifying the impact of dia-betes self-management education on glycemic control of type 2 DM patients after three months of intervention	A Double-arm post-test intervention study	45 type 2 DM patients (22 people in the experiential group and 23 people in the control group)	Lower glucose levels were found in the intervention group than in the control group. No substantial changes were seen in HbA1C levels.
A 2-Hour Diabetes Self-Management Education Program for Patients With Low Socioeconomic Status, Impr patients With Low Socioeconomic Status, Improves Shor es Short-Term Glycemic Control (33)	Determining the effectiveness of diabetes self-management education on glycemic control	A retrospective cohort study	94 type 2 DM patients	HbA1c levels decreased from 9.8% to 8.3% at an average of 4 months after participating in the Diabetes Self Management Education ($P<0.001$) program.
The effect of structured diabetes self-management education on type 2 diabetes patients attending a Primary Health Center in Kuwait (17)	Evaluated the impact of diabe-tes self-management education (DSME) on glycemic control measured by glycated haemoglobin (HbA1c) in patients with type 2 diabetes mellitus (T2DM) in Kuwait.	Single-center, controlled study.	291 type 2 DM patients (150 intervention groups and 141 control groups).	Patients who received DSME sessions showed better glycemic control (a decrease in HbA1c levels by 1.3% in the intervention group, while in the control group by 1.1%) with a p-value of < 0.001.
Efficacy of a self-management education program on patients with type 2 diabetes in primary care: A randomized controlled trial (26)	Assessing the effectiveness of diabetes self-management education on self-confidence and HBA1c levels of type 2 DM patients in the Spanish region	Randomized controlled trial	594 type 2 DM patients were divided into two groups (297 intervention and 297 control groups).	There was no difference in HbA1c levels in the intervention and control groups (p value= 0.307). There was an increase in self-efficacy (p-value = 0.018) after diabetes self-management education.

(continue on page S1188).

Table 1. The Results of The Article Review. (continue from page S1187).

Title, Author, Year	Research Objectives	Design	Sample	Results and Conclusions
Self-management education may improve blood pressure in people with type 2 diabetes. A randomized controlled clinical trial (34)	Identifying the effect of diabe-tes self-management education on clinical outcomes (blood pressure) and psychology of type 2 DM patients	Randomized controlled clinical trial	50 patients (25 intervention group patients and 25 control group patients)	Diabetes self-management edu-cation can control blood pressure, but no significant differences were found between the intervention and control groups.
The Effect of Modified Diabetes Self-management Education and Support on Self-care and Quality of Life among Patients with Diabetic Foot Ulcers in Rural Area of Indonesia, 2021 (35)	Determining the effectiveness of modified diabetes self-management education on self-care, the severity of diabetic foot injuries, and the quality of life in rural Indone-sia	A quasi-experimental design with pre-test and post-test control group design	60 type 2 DM patients (30 intervention group patients and 30 control group patients).	1). The degree of diabetic leg injury improved by 3.3%; 2) diabetic foot self-care behaviour scores increased by 8.8% and 3). quality of life increased by 32.7% points. These three indicators increased in the interven-tion group compared to the control group.
Effectiveness of a community-based diabetes self-management education (DSME) program in a rural agricultural setting (36)	Assessing the effectiveness of diabetes self-management education in rural agriculture	Prospective, education-intervention trial	155 patients (85 got DSME and 70 got standard care)	The DSME group had a lower HbA1C median after three and six months. After six months, there was a 0.5% reduction in median HbA1C levels in the DSME group and a 0.25% increase in the standard group. More participants in the DSME group had A1C ≤7.0% after three and six months.
Effectiveness of diabetes self-management education via a smartphone application in insulin-treated type 2 diabetes patients – design of a randomized controlled trial (37)	Evaluating the effectiveness of diabetes self-management education through a smartphone application in T2DM patients using insulin therapy	Randomised controlled trial	228 type 2 DM patients were divided into two groups (114 intervention groups and 114 control groups)	HbA1c levels were controlled after six months in the intervention group (HbA1c values ≤ 53 mmol/mol)
The impact of a self-management education program coordinated through WhatsApp on diabetes control (38)	Assess the effect of diabetes education programs through WhatsApp on hemoglobin glycosylation (HbA1c).	Randomized, two-arm parallel interventional study.	Two hundred eighteen patients were divided into two groups (109 people in the intervention group and 109 people in the control group).	There was a significant decrease in HbA1c levels in the intervention group (p value= 0.001) and not significant in the control group.

than in those who checked blood glucose levels themselves and received insulin therapy (39). Therefore, this study aims to identify the effect of diabetes self-management education by doctors using educational tools on the glycemic control of type 2 DM patients in Japan. The results of this study are not in line with two studies that show a similar reduction in HbA1c levels between the two groups (29). The research design was A retrospective cohort study involving 488 patients who followed DSME and 488 patients who did not follow the DSME program. This study was supported by one study that showed no difference in HbA1c levels in the intervention and control groups with a p-value of 0.307 (40).

Glycemic control is one indicator to assess type 2 DM patients' effectiveness in carrying out diabetes treatment. One of the study's results showed differences in HbA1c levels before and after DSME intervention was given in the intervention group (1). The study is in line with one of the studies involving 291 type 2 DM patients (150 people were involved in the intervention group, and 141 people were included in a control group). The research design used is a single-center controller study. The results of the study illustrated that patients who received DSME sessions showed better glycemic control (there was a decrease in HbA1c levels by 1.3 % in the intervention group, while in the control group by 1.1 %) with a p-value < 0.001 (17).

Furthermore, it was explained in a study that there was a decrease in HbA1c levels from 9.8.% to 8.3 % on an average of 4 months after participating in a diabetes self-management education program (33). Another study also found that HbA1c levels were controlled after 6 months in the intervention group with HbA1c values ≤ 53 mmol/mol (37). This study was supported by one study that showed that the DSME group had a lower HbA1c median after three and six months, whereas in the intervention group, there was a median reduction of 0.5 %, and many participants in the DSME group with HbA1c levels < 7.0 %, while in the control group there was an increase of 0.25 % (36). This study is similar to a study involving 218 Type 2 DM patients using a Randomized Controlled Trial design, illustrating a significant decrease in HbA1c levels in the intervention group with a p-value of 0.001 (38). However, the results of

this study are not in line with two studies that show no significant difference in HbA1c levels between intervention and control groups (31) (32).

DSME and Quality of Life

DM disease is a metabolic disease that requires long-term treatment and treatment so that it can have an impact on the quality of life of type 2 DM patients. Therefore, type 2 DM patients need education about diabetes management so that patients can do self-care and prevent various complications, thus improving their quality of life. Several studies have shown that DSME effectively improves the quality of life of type 2 DM patients. For example, one study showed that diabetes self-management education could improve the quality of life of type 2 DM patients by 32.7 % points. This study aims to determine the effectiveness of modified diabetes self-management education on self-care, the severity of diabetic foot injuries, and the quality of life in rural Indonesia. This study involved 60 type 2 DM patients divided into groups (30 intervention group people and 30 control group people). The design used was A Quasi-experimental design with a pre-test and post-test control group design (35).

DSME and Self-Efficacy

Self-efficacy is a belief in the ability possessed by a person to act. Type 2 DM patients need good self-efficacy to perform DM self-care in this case. It is further explained that self-efficacy is a major indicator of behaviour change and a major factor in controlling chronic diseases. Several literature reviews showed that the self-efficacy of type 2 DM patients increased after being given diabetes self-management education. One of the results showed an increase in self-efficacy with a p-value of 0.018 after being given diabetes self-management education (40). This study aims to examine the effectiveness of diabetes self-management education on self-efficacy and HbA1c levels of type 2 DM patients in Spain. The study involved 594 type 2 DM patients divided into two groups (297 belonged to the intervention group and 297 belonged to the control group). This study aims to examine the effectiveness of diabetes self-management education on the self-confidence of type 2 DM patients in Spain. The research design used was a Randomized Controlled Trial. In this study, type 2 DM patients received intervention for 12 months, and the impact was an increase in self-efficacy.

DSME and Blood Pressure

Individuals with DM disease risk developing hypertension (high blood pressure). Therefore, strong management is needed to prevent complications, one of which is hypertension. The literature study showed that type 2 DM patients who received diabetes self-management education experienced a decrease in blood pressure. One study showed a decrease in systolic blood pressure after 6 months and 12 months after the diabetes self-management education intervention. The study involved 221 type 2 DM patients. This study aims to evaluate the effect of DSME on the blood pressure of indigenous Hawaiians and the Pacific. The research design used is a Randomized Controlled Trial (30).

Based on the literature review results, a similar study was found involving 50 type 2 DM patients (25 intervention group patients and 25 control group patients). This study aims to identify the effect of diabetes self-management education on clinical outcomes, namely blood pressure. The research design used was a Randomized Controlled Trial. The study's results illustrated that diabetes self-management education could control blood pressure, but no significant difference was found between the intervention and control groups. In this study, the intervention group was educated and evaluated after four years, and it was proven that blood pressure was controlled (34).

DSME and Psychological Status

DM disease can affect the psychology of people with DM. This condition is caused because DM is a chronic disease that requires proper and comprehensive treatment, so it is not uncommon to cause a feeling of saturation, anxiety, and stress which has an impact on decreasing adherence to treatment and treatment. The results of a literature review from one of the studies showed

differences in the level of anxiety and depression between the intervention and control groups after being given diabetes self-management education for 6 months. This study aims to evaluate the effectiveness of diabetes self-management education on the psychological outcomes of type 2 DM patients. The study also involved 118 type 2 DM patients (63 people belonged to the intervention group and 55 people belonged to the control group). The research design used is Quasi-experimental (11).

A literature review of the impact of DSME on psychological status was also found in a similar study on the effectiveness of diabetes self-management education for type 2 DM patients undergoing outpatient treatment in China. This study aims to assess the effectiveness of the diabetes self-management education program in the outpatient unit and involves 60 type 2 DM patients, divided into 2 groups, namely 30 people who are members of the intervention group and 30 people who are members of the control group. The research design used was a Randomized Controlled trial. In this study, the intervention group was given two sessions of education and regular education. The educational program for the intervention group consists of theory and practice. Theoretical learning uses various media, while practical learning uses individual models and practices. The results showed a difference in the average psychological distress score in the intervention and control groups after being given diabetes self-management education (1).

DSME and Self-Care Behavior

Patients with type 2 DM need to perform good self-care behaviours to achieve adequate glycemic control. The results of a literature review of several research results show that diabetes self-management education has a positive impact on self-care behaviour. One study on the effectiveness of self-management education for patients with type 2 DM in Thailand showed an increase in diabetic self-care behaviour in the intervention group (29). The results of this study are similar to one of the studies that found that there was a difference in the average self-care score (p-value < 0.01) which consisted of dietary control (p-value < 0.01), physical activity (p-value < 0.05, foot care (p-value = p value < 0.01). This condition shows the influence of diabetes self-management education on self-care behaviour (1). Furthermore, the results of a literature review from one of the studies on the effectiveness of diabetes self-management education showed that the self-care behaviour score increased by 8.8 %. This condition illustrates that diabetes self-management education positively affects self-care behaviour (35).

DISCUSSION

Impact of DSME on Glycemic Control of type 2 DM Patients

A study on the effectiveness of diabetes self-management education using a smartphone application showed differences in HbA1c levels in the intervention group and control group after being given diabetes self-management education for six months (37). These results were not in line with one of the studies that showed no significant difference in HbA1 levels between the intervention group and the control group, with a p-value of 0.307 (26,31). It was further explained that HbA1c levels tend to decrease in patients who already have an essential HbA1c value of around 7.4 – 10.4 %, or it can be concluded that patients with generally reasonable glycemic control will quickly experience a decrease in HbA1c levels after being given interventions compared to patients with poor glycemic control. The results of this study were supported by research on the effectiveness of diabetes self-management education in type 2 DM patients in Thailand. There was no significant difference in HbA1 levels between the intervention and control groups after being given education for two years. This result also illustrates that for patients who received diabetes self-management education, the achievement of HBA1c levels was the same as patients who only received regular care in the same hospital (29).

Glycemic control is essential in evaluating the impact of treating DM patients. Glycemic control includes 3 (three) essential aspects, namely fasting blood sugar levels, post-prandial blood sugar levels, and HbA1c levels (11). Based on the results of a study of several kinds of literature, it is explained that diabetes self-management

education positively impacts the glycemic control of type 2 DM patients. The results of a study on the effect of diabetes self-management education on blood glucose levels of patients who were newly diagnosed with type 2 DM found data that there was a difference in fasting blood sugar levels, 2 h post-prandial (PP) and HBA1c levels in the intervention group and control group after intervention for six months (11). This study's results align with one of the studies that found data that there were differences in HbA1c levels, fasting blood sugar levels, and 2 hours post-prandial (PP) in the intervention group and control group after two sessions of providing diabetes self-management education (1). This result was supported by another study that showed a decrease in HbA1c levels in the intervention group after the 4th year of the intervention compared to the control group (34). It was further explained that HbA1c levels increased significantly in the intervention group, and there was no increase in the control group (28). This study proves that diabetes self-management education affects HbA1c levels in middle-adult patients with type 2 DM. It is therefore suggested that to achieve effective diabetes self-management education, all hospitals need to be managed with diabetes care with diabetes nurses and multidisciplinary teams trained in diabetes self-management education and support. This HbA1 level can also be used as an indicator to predict the possibility of complications in type 2 DM patients, so the effectiveness of education with modifications to other aspects needs to be done to achieve adequate glycemic control so that various complications due to DM can be minimized.

Impact of DSME on The Quality of Life of type 2 DM Patients

DM disease can affect the quality of life of type 2 DM patients; in this case, it decreases health-related quality (41). Some research results show that poor glycemic control can decrease the quality of life; however, if the glycemic control is adequate, the quality-of-life increases. One study showed that the quality of life of type 2 DM patients with diabetic foot ulcers increased in the intervention group compared to the control group after diabetes self-management education (35). The results of this study are in line with research on the effect of diabetes self-management education on the quality of life of female patients with type 2 DM that there was a significant change in the quality of life in the group that received diabetes self-management education compared to the control group (42). This condition shows that diabetes self-management education effectively improves the quality of life of type 2 DM patients.

Impact of DSME on Self-Efficacy of type 2 DM Patients

The study results from the literature review showed an increase in self-efficacy in the intervention group compared to the control group after being given diabetes self-management education (26). Self-efficacy is an individual's assessment of his ability to organize and take action (43). It is further explained that self-efficacy is an individual's belief in his ability to display activities that affect his life, which is related to his ability to perform self-care (44). The research results from a literature review showed an increase in self-efficacy in the intervention group compared to the control group after being given diabetes self-management education (26). Self-efficacy is a crucial indicator of behaviour change. If type 2 DM patients have good self-efficacy, then DM patients can carry out self-care behaviours to prevent various complications.

Impact of DSME on Blood Pressure of type 2 DM Patients

The risk of hypertension increases in patients with type 2 DM, so various interventions must be carried out to improve patient adherence to treatment and treatment. One of the interventions provided is diabetes self-management education. The results of a literature review on the effect of diabetes self-management education on blood pressure showed that DSME intervention for six months could lower systolic blood pressure, and a significant decrease in diastolic blood pressure occurs after six months and 12 months post-intervention (30). Some research results also show that DSME effectively lowers the blood pressure of DM patients with hypertension. This statement is in line with one study that diabetes self-management education affects blood

pressure reduction in the intervention group. However, no significant differences were found between the intervention and control groups (34). The results of other studies showed that DSME intervention improved blood pressure in type 2 DM patients with a p-value < 0.001 (27). It was further explained that 9.1 % of patients showed blood pressure within the recommended limit of 130/80 mmHg. Therefore, it can be concluded that diabetes self-management education affects controlling blood pressure for type 2 DM patients. Therefore, educational interventions can be developed to prevent cardiovascular complications in type 2 DM patients.

Impact of DSME on The Psychological Status of type 2 DM Patients

Diabetes self-management education is considered to be able to reduce psychological stress in type 2 DM patients. This is illustrated by the results of the study that there were differences in the level of anxiety and depression between the intervention and control groups after educational interventions for six months (11). It was further explained that the anxiety score in the intervention group was compared to the control group (36.00 vs 42.50 with a p-value of < 0.05) and a depression score (35.55 vs 44 with a p-value of < 0.05). This study's results align with other studies that show differences in stress levels between the intervention group and the control group after being given a DSME intervention with a p-value of 0.007 (42).

A person with DM disease has the potential to experience psychological stress as a result of the presence of chronic diseases that require long-term treatment (45). It was further explained that individuals with diabetes have a high prevalence of experiencing depression and anxiety (4). Stressful conditions also cause the endocrine system to release excessive glucocorticoid hormones, disrupting glucose production in the liver and reducing insulin sensitivity which can cause hyperglycemia (46). The existence of diabetes self-management education has a positive impact on reducing psychological stress levels, so it needs to continue to be carried out by health workers and applied in various health service settings.

Impact of DSME on Self-Care Behaviour of type 2 DM Patients

Self-management education is a form of intervention provided so that patients can improve their knowledge and skills and have the self-confidence to do self-care (11). Several studies have shown the positive impact of diabetes self-management education on self-care behaviour. A literature review from one of the studies showed an increase in self-care behaviour in the intervention group after being given education (29). The results of this study were supported by a study on the effect of diabetes self-management education on type 2 DM patients in China that there was a difference in the average SDSCA score / Summary Diabetes Self Care Activity (p-value < 0.01) between the intervention group and the control group after being given education with details of dietary control (p-value < 0.01), physical activity (p-value < 0.01), treatment adherence (p-value > 0.05), foot care (p-value < 0.01) and monitoring blood sugar levels with a p-value of > 0.05 (1). The results of this study are also in line with other studies that education improves the practice of self-care behaviour in type 2 DM patients (47).

Self-care behaviour is a crucial indicator in improving glycemic control (29). Adherence to self-care will have an impact on controlling blood glucose levels. DM patients need to understand good self-management so that they have the ability and awareness to carry out self-care behaviours. Some of the results of this study illustrate that, in general, diabetes self-management education can affect self-care behaviour. It is further explained that several things need to be considered to improve the effectiveness of education to encourage patients to discuss the problems encountered, such as fear of performing insulin injections or teaching techniques used to inject insulin to increase physical comfort. This will also have a direct impact on adherence to treatment. Based on some of the descriptions and explanations above, it can conclude that diabetes self-management education positively influences the self-care behaviour of type 2 DM patients.

Limitations of the study

This systematic review used PRISMA guidelines to identify studies that included the educational impact of limited diabetes self-management in middle adult patients with type 2 DM, which has an impact on a lack of literature on the impact of diabetes self-management education on quality of life. Another limitation of this study is that some terms may be omitted as keywords in the initial search, thus hiding related studies.

CONCLUSION

Sixteen pieces of literature found that diabetes self-management education is one of the most effective interventions to improve glycemic control, self-efficacy, quality of life, controlled blood pressure, reduce psychological stress and improve self-care behaviour, especially in middle adult patients with type 2 DM.

REFERENCES

1. Zheng F, Liu S, Liu Y, Deng L. Effects of an outpatient diabetes self-management education on patients with type 2 diabetes in China: a randomized controlled trial. J Diabetes Res. 2019;1073131.
2. Susanti E, Donosepoetro M, Patellongi I, Arif M. Differences between several atherogenic parameters in patients with controlled and uncontrolled type 2 diabetes mellitus. Med J Indones. 2010;19(2):103-108.
3. Bakar A, Qomariah SN, Santoso CH, Gustomi MP, Syaful Y, Fatmawa L. Factors the incidence of hypoglycemia in diabetes mellitus patients: A pilot study in the emergency room. Enferm Clin. 2020;30:46-49.
4. Heise M, Heidemann C, Baumert J, Du Y, Frese T, Avetisyan M, et al. Primary Care Diabetes Structured diabetes self-management education and its association with perceived diabetes knowledge, information, and disease distress: Results of a nationwide population-based study. 2022;16:387-394.
5. Nuh H, Tintin S, Dwi P, Nursalam N, Qori'Ila S. Effectiveness Education Based on Self Efficacy for Strengthening Behavior of Foot Care in Diabetes Mellitus Patients in Indonesia. Rev Int Geogr Educ. 2021;11(5):272-279.
6. Rochmah N, Faizi M, Hisbiyah Y, Triastuti IW, Wicaksono G, Endaryanto A. Quality of life differences in pre-and post-educational treatment in type 1 diabetes mellitus during COVID-19. Diabetes, Metab Syndr Obes Targets Ther. 2021;14:2905.
7. Samudera WS, Efendi F, Indarwati R. Effect of community and peer support based healthy lifestyle program (CP-HELP) on self care behavior and fasting blood glucose in patient with type 2 Diabetes Mellitus. J Diabetes Metab Disord. 2021;20(1):193-199.
8. Saudi RA, Abbas RA, Nour-Eldein H, Ahmed HAS. Illness perception, medication adherence and glycemic control among primary health-care patients with type 2 diabetes mellitus at Port Said City, Egypt. Diabetol Int. 2022;(0123456789).
9. Pertiwi MV, Alfian R, Nita Y, Athiyah U. Medication adherence of diabetes mellitus patients in Indonesia: A systematic review. Pharm Educ. 2022;22(2):188-193.
10. Muhammad Haskani NH, Goh HP, Wee DVT, Hermansyah A, Goh KW, Ming LC. Medication Knowledge and Adherence in Type 2 Diabetes Mellitus Patients in Brunei Darussalam: A Pioneer Study in Brunei Darussalam. Int J Environ Res Public Health. 2022;19(12):7470.
11. Chai S, Yao B, Xu L, Wang D, Sun J, Yuan N, et al. The effect of diabetes self-management education on psychological status and blood glucose in newly diagnosed patients with diabetes Type 2. Patient Educ Couns. 2018;101(8):1427-1432.
12. Ahangari H, Moasheri B, Norouzi E, Shayesteh M. The Prevalence of Stress, Anxiety and Depression in Patients with Type 2 Diabetes and Their Association with Demographic Factors. 2016;4:13-22.
13. Rondhianto R, Nursalam N, Kusnanto K, Melaniani S, Ahsan A. Analysis of the sociodemographic and psychological factors of the family caregivers' self-management capabilities for type 2 diabetes mellitus. J Ners. 2019;14(2):215-223.
14. Vasanth R, Ganesh A, Shanker R. Impact of stress on Type 2 Diabetes mellitus management. 2017;29:416-421.
15. Tan CCL, Cheng KKF, Hwang SW, Zhang N, Holroyd E, Wang W. Effect of a Diabetes Self-Efficacy Enhancing Program on Older Adults With Type 2 Diabetes: A Randomized Controlled Trial. Clin Nurs Res. 2020;29(5):293-303.
16. International Diabetes Federation. Diabetes Atlas. six Edition. Africa; 2021.
17. Alibrahim A, AlRamadhan D, Johny S, Alhashemi M, Alduwaisan H, Al-Hilal M. The effect of structured diabetes self-management education on type 2 diabetes patients attending a Primary Health Center in Kuwait. Diabetes Res Clin Pract. 2021;171:108567.

18. Borg S, Gerdtham UG, Eeg-Olofsson K, Palaszewski B, Gudbjörnsdottir S. Quality of life in chronic conditions using patient-reported measures and biomarkers: A DEA analysis in type 1 diabetes. Health Econ Rev. 2019;9(1)31.
19. Baraz S, Zarea K, Shahbazian HB. Impact of the self-care education program on quality of life in patients with type II diabetes. Diabetes Metab Syndr Clin Res Rev. 2017;11:S1065-1068.
20. Hadisuyatmana S, Efendi F, Has EMM, Wahyuni SD, Bauer M, Boyd JH, et al. The Experience of Indonesian Men Living with Type-2 Diabetes Mellitus and Erectile Dysfunction: A Semi-structured Interview Study. Sex Disabil. 2021;39(2):245-260.
21. Sari Y, Isworo A, Upoyo AS, Taufik A, Setiyani R, Swasti KG, et al. The differences in health-related quality of life between younger and older adults and its associated factors in patients with type 2 diabetes mellitus in Indonesia. Health Qual Life Outcomes. 2021;19(1):1-10.
22. ADA. Standard of medical care in Diabetes 2020. 2020;43(1): S1-212.
23. Li Z, Chen Q, Yan J, Liang W, Wong WCW. Effectiveness of motivational interviewing on Improving Care for Patients with type 2 diabetes in China: A randomized controlled trial. BMC Health Serv Res. 2020;20(1)57.
24. Hailu FB, Moen A, Hjortdahl P. Diabetes self-management education (DSME) – Effect on knowledge, self-care behavior, and self-efficacy among type 2 diabetes patients in Ethiopia: A controlled clinical trial. Diabetes, Metab Syndr Obes Targets Ther. 2019;12:2489-2499.
25. Saghaee A, Ghahari S, Nasli-Esfahani E, Sharifi F, Alizadeh-Khoei M, Rezaee M. Evaluation of the effectiveness of Persian diabetes self-management education in older adults with type 2 diabetes at a diabetes outpatient clinic in Tehran: a pilot randomized control trial. J Diabetes Metab Disord. 2020;19(2):1491-1504.
26. Gamboa Moreno E, Mateo-Abad M, Ochoa de Retana García L, Vrotsou K, del Campo Pena E, Sánchez Perez Á, et al. Efficacy of a self-management education programme on patients with type 2 diabetes in primary care: A randomised controlled trial. Prim Care Diabetes. 2019;13(2):122-133.
27. Azami G, Soh KL, Sazlina SG, Salmiah MS, Aazami S, Mozafari M, et al. Effect of a Nurse-Led Diabetes Self-Management Education Program on Glycosylated Hemoglobin among Adults with Type 2 Diabetes. J Diabetes Res. 2018;2018.
28. Tanaka N, Yabe D, Murotani K, Yamaguchi Y, Fujita Y, Kubota S, et al. Effects of physician's diabetes self-management education using Japan Association of Diabetes Education and Care Diabetes Education Card System Program and a self-monitoring of blood glucose readings analyzer in individuals with type 2 diabetes: An exp. 2021;12(12):2221-2231.
29. Tachanivate P, Phraewphiphat R, Tanasanitkul H, Jinnawaso R. Effectiveness of Diabetes Self–Management Education in Thais with Type 2 Diabetes. 2019;(March):74-86.
30. Chatrathi E, Sinclair KA, Id NN, Calcagni M, Id JP. Examining elevated blood pressure and the effects of diabetes self-management education on blood pressure among a sample of Marshallese with type 2 diabetes in Arkansas. 2021:1-11.
31. Gathu CW, Shabani J, Kunyiha N, Ratansi R. Effect of diabetes self-management education on glycaemic control among type 2 diabetic patients at a family medicine clinic in Kenya: A randomised controlled trial. African J Prim Heal Care Fam Med. 2018;10(1):1-9.
32. Abdulah DM, Hassan AB, Saadi FS, Mohammed AH. Impacts of self-management education on glycaemic control in patients with type 2 diabetes mellitus. Diabetes Metab Syndr Clin Res Rev. 2018;12(6):969-975.
33. Jakoby MG, Schleder M, Luff V, Yergler C, Botchway A, Burns C. A 2-Hour Diabetes Self-Management Education Program for Patients With Low Socioeconomic Status Improves Short-Term Glycemic Control. J Patient-Centered Res Rev. 2020;7(3):275-281.
34. Trento M, Fornengo P, Amione C, Salassa M, Barutta F, Gruden G, et al. Nutrition, Metabolism & Cardiovascular Diseases Self-management education may improve blood pressure in people with type 2 diabetes. A randomized controlled clinical trial. Nutr Metab Cardiovasc Dis. 2020;30(11):1973-1979.
35. Damhudi D, Kertia N, Effendy C. The effect of modified diabetes self-management education and support on self-care and quality of life among patients with diabetic foot ulcers in rural area of Indonesia. Open Access Maced J Med Sci. 2021;9:81-87.
36. Paz-pacheco E, Sandoval MA, Ardena GJR, Paterno E, Juban N. Effectiveness of a community-based diabetes self-management education (DSME) program in a rural agricultural setting. 2017:35-49.
37. Boels AM, Vos RC, Dijkhorst-Oei LT, Rutten GEHM. Effectiveness of diabetes self-management education and support via a smartphone application in insulin-treated patients with type 2 diabetes: Results of a randomized controlled trial (TRIGGER study). BMJ Open Diabetes Res Care. 2019;7(1):1-10.
38. Al Omar M, Hasan S, Palaian S, Mahameed S. The impact of a self-management educational program coordinated through Whatsapp on diabetes control. Pharm Pract (Granada). 2020;18(2):1-9.

39. Tanaka N, Yabe D, Murotani K, Yamaguchi Y, Fujita Y, Kubota S, et al. Effects of physician's diabetes self-management education using Japan Association of Diabetes Education and Care Diabetes Education Card System Program and a self-monitoring of blood glucose readings analyzer in individuals with type 2 diabetes: An exploratory, open-labeled, prospective randomized clinical trial. 2021;12(12):2221-2231.

40. Gamboa E, Mateo-Abad M, Pena C, Sánchez Á, Martínez C, Carlos J, et al. Efficacy of a self-management education programme on patients with type 2 diabetes in primary care: A randomised controlled trial. 2018;3:122-133.

41. Diabetes WJ. World J Diabetes. 2017;9358(4).

42. Nooseisai M, Viwattanakulvanid P, Kumar R, Viriyautsahakul N, Muhammad Baloch G, Somrongthong R. Effects of diabetes self-management education program on lowering blood glucose level, stress, and quality of life among females with type 2 diabetes mellitus in Thailand. Prim Heal Care Res Dev. 2021;22:e46.

43. Sousa MC de, Malaquias BSS, Chavaglia SRR, Ohl RIB, Paula FFS de, Silva KS da, et al. Self-efficacy in elderly with type 2 Diabetes Mellitus. Rev Bras Enferm. 2020;73(Suppl 3):e20180980.

44. Sousa MR, Pereira F, Martins T, Rua I, Ribeiro I, Cerdeira C, et al. Impact of an educational programme in Portuguese people with diabetes. Action Res. 2019;17(2):258-276.

45. Tunsuchart K, Lerttrakarnnon P, Srithanaviboonchai K, Likhitsathian S, Skulphan S. Type 2 Diabetes Mellitus Related Distress in Thailand. Int J Environ Res Public Health. 2020;17(7):2329

46. Di Dalmazi G, Pagotto U, Pasquali R, Vicennati V. Glucocorticoids and Type 2 Diabetes : From Physiology to Pathology. 2012; J Nutr Metab. 2012; 2012:525093.

47. Nkomani S, Ruskaniko S, Blaauw R, Group F. The impact of existing diabetes self-management education interventions on knowledge, attitudes and practices in public health care institutions in Harare, Zimbabwe. South African J Clin Nutrition, 2019:1-7.

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