



Effectiveness of Diabetes Self-management Education Against Diet Behavior in Patients Type 2 Diabetes Mellitus: A Literature Review

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Abstract

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BACKGROUND: Diabetes mellitus (DM) is a disease that describes a problem with insulin deficiency and the inability of the pancreas to produce enough insulin. The World Health Organization predicts that the number of people with DM type II in Indonesia will increase to 12 million by 2030.

AIM: This study looks at Journals on diabetes selfmanagement education (DSME) on DM patients in improving dietary behavior.

METHODS: This study uses an online journal database that provides free articles and journals in PDF such as: ProQuest, EBCSO, PubMed, Elsevier, Scinapse, MDPI, and Google Scholar. Literature was collected from the past 10 years, namely, 2010–2020 using the following set of keywords: “DSME,” “DSME Program Evaluation,” and “Diabetes Self-Care Education.”

RESULTS: DSME intervention can improve the condition of DM patients if it is routinely carried out. In addition, the DSME intervention was able to control hemoglobin A1c levels and control blood sugar. This intervention still needs to be developed, considering that various forms of education in DM patients have been carried out such as using text messages, leaflets, illustrated pictures or leaflets, by telephone, video, handbooks, or direct education. These investigations can be developed into empirical research.

CONCLUSIONS: The application of DSME interventions can help improve the conditions experienced by DM type II sufferers if it is routinely carried out.

Introduction

Diabetes mellitus (DM) is a chronic metabolic disease, which is emerging as a major public health problem. The worldwide prevalence of diabetes in adults is estimated at 4.0% in 1995 and is expected to increase to 5.4% in 2025. The number of adults with diabetes in Indonesia is expected to increase from 6.9 million in 2010 to 12 million in 2030 [1]. DM is an established risk factor for several causes of death, including ischemic heart disease, stroke, kidney disease, infectious diseases, and some cancers [2].

DM is a health problem that is increasing worldwide. It is estimated that there will be 552 million patients with diabetes and 300 million people with impaired glucose tolerance by 2030 [3]. According to the International Diabetes Federation (IDF), >382 million people worldwide had diabetes in 2012; that number is expected to grow to 592 million

by 2035 [4]. In 2015, there were 415 million people with diabetes worldwide (91% of whom were type 2 diabetes) with a figure expected to increase to 642 million by 2040 [5].

The prevalence of DM will continue to increase every year, and data from the IDF show that the number of patients diagnosed with DM in Indonesia is estimated to increase from 10.3 million in 2017 to 16.7 million in 2045 [6].

One study in India reported that 63% of patients who were not adherent to the diet program and glucose monitoring were involved. A 2010 Delamater study showed approximately 48% of patients did not follow a diet plan and physical activity program. He also reported that 70% of patients were not adherent to the high carbohydrate and high-fiber diet program [7].

The purpose of this study was to determine the effectiveness of diabetes self-management education (DSME) on dietary behavior in type 2 DM patients. The systematic review process is shown in Figure 1.

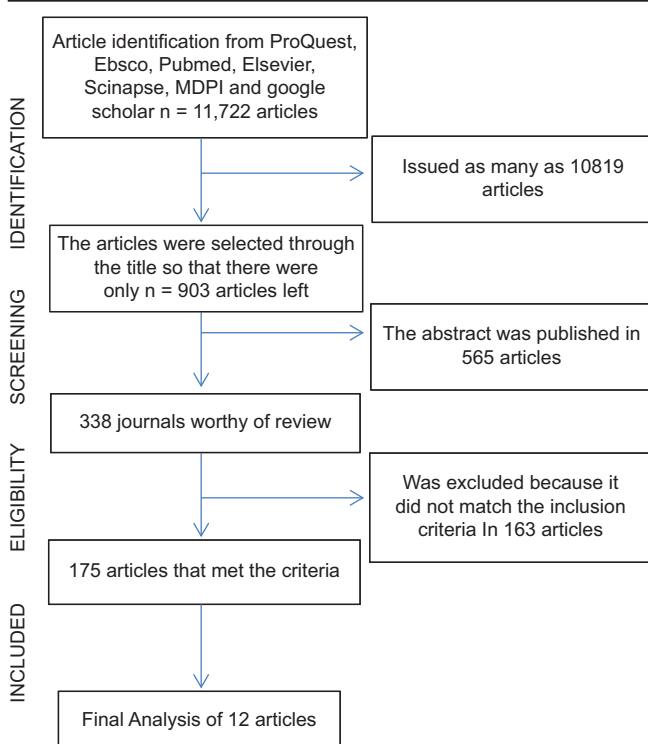


Figure 1: Input and output diagram of primary studies to final synthesis

Methods

This study looks at online journal databases that provide free national and international articles and journals in PDF form such as Google Scholar, Academia.edu, ProQuest, EBSCO, PUBMED, Elsevier, and Scinapse. Other sources such as textbooks from libraries, national health reports, theses, and dissertations are also used as well as research results abstracts or proceedings, to keep information up-to-date. The information used is mainly from literature collected from the past 10 years from 2010 to 2020, based on the following set of keywords: “DSME “DSME Program Evaluation,” and “Diabetes Self-Care Education.”

The writing of this literature review refers to the Preferred Reporting Items for Systematic Reviews guidelines. The review stage is the identification of articles from the source data base (identification), filtering articles based on inclusion and exclusion

Table 1: List of articles on criteria in the literature review

Inclusion	Exclusion
The literature taken is literature that discusses DSME in DM patients	Just abstract
DSME intervention gives results or impacts on DM sufferers	Incomplete text
The population studied is clear	Double publication
Full texts	The population studied is unclear
Journals published in the past 10 years (2010–2020)	
English language articles	
Open access	

DSME: Diabetes self-management education, DM: Diabetes mellitus.

in Table 1 (screening) criteria, selecting all articles that match the inclusion criteria (eligibility), and determining articles that match the design of the DSME research plan) included. The total articles obtained from Scinapse, PUBMED, and Google Scholar are 11,722 articles.

Results

The systematic review of DSME in improving dietary behavior is summarized in Table 2.

Discussion

DSME is an important component in providing quality care to all diabetics. DSME helps patients develop the knowledge, skills, and abilities necessary for effective self-care. Diabetes programs as a behavioral and psychosocial strategy to facilitate self-care so as to provide better results. Several DSME interventions are capable of providing effective change in promoting behavior change [19]. DSME as an effective education, cost protection, can prevent complications. A variety of culturally appropriate services is offered as a form of regulation, utilizes technology, facilitates access to DSME services, makes self-management decisions, and reduces the likelihood of complications [10], [20]. DSME has positive effects on the clinical, psychosocial, and behavioral aspects of diabetes [20].

Diabetes self-management is a form of diabetes health education to improve health knowledge and behavior [21]. Diet modification, physical activity, stress management, and pharmacological therapy all play a role in achieving the desired outcome for diabetes [4]. Diabetes self-management support refers to the support needed to apply and maintain skills and behaviors in a sustainable manner [22]. The Society of Behavioral Medicine explains that DSME and support is the basis for DM sufferers regarding diabetes management to reduce complications [23]. Thus, implementation of support education considers effective in preventing the development of diabetic foot ulcer (DFU), including signs of pre ulcer.

Of all, strategies that can be used to prevent ulcers and further complications in DM patients include educational support to patients, multidisciplinary treatment, close monitoring, and prevention of DFU, including signs of pre ulcer.

Table 2: Information on DSME on diet behavior

No.	Author/Year/Title	Subject	Study objective	Design	Study outcome	Recommendation	Variable researched
1.	[8] Assessment of a National Diabetes Education Program diabetes management booklet: The Glycemic Reduction Approach to Diabetes: A Comparative Effectiveness Study (GRADE) experience	348 adults with type 2 diabetes data were taken from October 2013 to June 2014	To explore the impact of the 4 steps on participants' knowledge of diabetes management and self-reliance in a GRADE	Pre- and post-test	The findings of this study suggest that the 4 steps booklet can help primary health-care providers to educate and support patients with type 2 diabetes and improve knowledge of diabetes management and self-efficacy	Diabetes education requires a variety of interventions and tools, and diabetes education programs must continue to produce accessible and evidence-based information for patients, providers, and partners to help prevent and manage diabetes	Knowledge and self-efficacy
2.	[9] Effectiveness of a diabetes education and self-management program (DESMOND) for people with newly diagnosed type 2 DM: 3-year follow-up of a cluster randomized controlled trial (RCT) in primary care	DM patients in 207 general practices in 13 primary care centers in the UK. Follow-up 3 years	To assess the effectiveness of DESMOND for people with newly diagnosed type 2 DM	Cluster RCT	Hemoglobin A1c (HbA1c) levels at 3 years decreased in both groups. However, the difference was not significant (difference -0.02 , 95% confidence interval $-0.22-0.17$) after the intervention. The same is the case for biomedical and another lifestyle and drug use. the depression scores and quality of life did not differ at 3 years	Future studies will need to include a longer follow-up period to produce an understanding of the effects of the intervention overtime	Biomedical, lifestyle, depression score, and quality of life
3.	[3] The Effect of DSME on Body Weight, Glycemic Control, and Other Metabolic Markers in Patients with Type 2 DM	76 patients with type 2 diabetes	To evaluate the effect of short-term DSME on metabolic markers and atherosclerotic parameters in patients with type 2 diabetes	Two-group experimental design	DSME can increase HbA1c and body weight in patients with type 2 diabetes	<ul style="list-style-type: none"> The time intervals from baseline and assessment of follow-up were relatively short. Therefore, the possible changes in CIMT, CAS, and some of the metabolic markers associated with DSME were not demonstrated The long-term effect of intensity self-management education in diabetic patients was not fully evaluated in this study The study size was small with only 36 patients in the intervention group and 40 patients in the control group. Further investigation of the long-term effects of DSME and with a larger sample size is suggested 	Weight, glycemic control, and marker
4.	[10] The Efficacy of Diabetes Patient Education and Self-Management Education in Type 2 Diabetes	Adults with diabetes type 2	To compare 6-month progress in diabetes patient education with a supplementary education model with a self-management program	The experimental group subjects and control group subjects	There were statistically significant improvements in both groups in terms of glycated HbA1c and body weight, and the experimental group had statistically significant improvements in four additional results	It needs to be extrapolated to a larger adult population with type 2 diabetes who is referred to a diabetes education center	HbA1c and weight loss
5.	[11] Persian DSME (PDSME) program: evaluation of effectiveness in Iran	Individuals aged 18 years and over	To design the PDSME program using intervention mapping to assess the effectiveness of the program in people newly diagnosed with type 2 diabetes and those who received little self-management education	Two-group experimental design	The PDSME group showed a significant increase in mean HbA1c (-1.1 versus $+0.2\%$, $P=0.008$). Knowledge of diabetes increased more in PDSME patients treated with oral antidiabetic agents than in those receiving usual care overtime (RMA), ($F=67.08$, $P<0.001$). A statistically significant improvement was seen in PDSME patients for self-care behavior, health beliefs, attitudes toward diabetes, stigma, self-efficacy, and patient satisfaction	Researchers must find ways to identify and help hard-to-reach patients	HbA1C, knowledge, self-care activities, psychosocial, and depression
6.	[12] Effectiveness of DSME through a smartphone application in insulin treated type 2 diabetes patients – design of a RCT (“TRIGGER study”)	Patients DM aged 40–70 years, undergoing insulin therapy for at least 3 months, Control group 114 and intervention group 114 respondents, follow-up 3 months	To evaluate the effectiveness of DSME through a smartphone application in T2DM patients on insulin therapy	Non-blinded two-arm multicenter randomized controlled superiority trial with parallel groups and equal randomization (“TRIGGER study”)	Innovative solutions are needed to increase the effectiveness of self-management, for an increasing number of T2DM patients. This trial will provide evidence of the effectiveness of a newly developed smartphone application designed to promote diabetes self-management	There should be policies aimed at improving diabetes self-management	HbA1C, behavior change, cost-effectiveness

(Contd...)

Table 2: (Continued)

No.	Author/Year/Title	Subject	Study objective	Design	Study outcome	Recommendation	Variable researched
7.	[13] The effect of text message support on diabetes self-management in developing countries – A randomized trial	480 adults with diabetes (Type 1 or type 2)	To assess differences in the proportion of subjects in diabetic patients with the DSME program group and DSME+diabetes self-management support (DSMS)	RCT	The proportion of subjects with controlled HbA1c was 2.8% higher in the intervention group than in the control group (the difference was not statistically significant).	MHealth can be a useful tool for health-care providers, in reaching out to patients; it may be more interesting to examine more dynamic mechanisms to improve mutual connectivity between patients, providers, and support systems.	HbA1C
8.	[14] DSME – Effect on Knowledge, Self-care Behavior, and Self-efficacy Among Type 2 Diabetes Patients in Ethiopia: A Controlled Clinical Trial	Patients with type 2 DM, 116 intervention groups and 104 comparison groups	To determine the effect of DSME on diabetes knowledge, self-care behavior, and self-efficacy were measured at baseline and at 9 months after initiation of the DSME intervention (end point) in both groups	Two-group experimental design	The study found significant improvements in the intervention participants' diabetes knowledge scores and their adherence to diet and foot care recommendations. This suggests that our DSME intervention may be of clinical importance in a developing country like Ethiopia	This DSME is important and enhances the self-management capacity of T2DM patients in low-resource settings but requires further assurance in development and testing for use in developing countries	Knowledge, self-care behavior, and self-efficacy
9.	[15] Comparative Effectiveness of a Mindful Eating Intervention to a Diabetes Self-Management Intervention among Adults with Type 2 Diabetes: A Pilot Study	Patients with type 2 diabetes for 1 year or more aged 35–65 years	To determine the effectiveness of a mindful eating intervention for diabetes independent management	RCT	There were no significant differences between groups in changes in body weight or glycemia at the end of the study. Significant differences occurred between groups in changes in food intake	Further studies focused on treatment (i.e., MNT vs. dietary attention vs. treatment combination) and whether the magnitude of change was greater when patients chose one of the above approaches. Alternatively, some patients may have diabetes prefer to complete a DSME based course first to study MNT basics and self-management are followed	Diet, physical activity, body weight, HbA1c and fasting plasma glucose, and fasting insulin
10.	[16] Evaluating the Impact of DSME Methods on Knowledge, Attitude, and Behavior (KAB) of Patients with Type 2 DM	Patients with type 2 diabetes were 21 people	Comparing the effectiveness of the two methods DSME by examining changes HbA1c, KAB after traditional group education (TE) or with diabetes map conversation (CM). The CM group was postulated to show a greater decrease in A1C and an improved score KAB was compared with the TE group	RCT	The results of the study were reported to have a significant impact on increasing HbA1C levels, diabetes knowledge, attitudes toward diabetes, and self-care behavior from baseline to 3 months thereafter	How to make diabetes education programs more effective in meeting patients' needs and changing their attitudes/behaviors for long-term diabetes self-management taking into account demographic/ psychosocial characteristics and diabetes educator skills/ experiences in teaching	KAB, HbA1C
11.	[17] The Effects of Intensive Nutrition Education on Late Middle-Aged Adults with Type 2 Diabetes	196 patients between the ages of 50 and 65 met the criteria for type 2 diabetes	To investigate whether intensive nutrition education would benefit middle-aged patients with type 2 diabetes	RCT	Intensive nutritional education has a significant effect on blood glucose control in middle-aged adults with type 2 diabetes. Intensive education can foster good dietary habits and increase physical activity, which is important for diabetic patients in the short and long term	Generalization of programs for patients with type 2 diabetes from various cultural backgrounds	Knowledge, diet, exercise, and blood glucose control
12.	[18] Effectiveness of A Multifactorial Intervention in Increasing Adherence to the Mediterranean Diet (MD) among Patients with DM Type 2: A Controlled and Randomized Study (EMID Study)	204 subjects between 25 and 70 years with T2DM	To assess the effectiveness of multifactorial interventions to improve adherence to MD, dietary quality, and biomedical parameters	Randomized and controlled	This multifactorial intervention improved adherence to MD and quality of diet among patients with T2DM	The exposure to the intervention was short (3 months) so that it could be considered in future studies, in addition, it is multifactorial the intervention made it impossible to know which components resulted in changes in group learning	Compliance, quality, and biomedical

DSME: Diabetes self-management education, DM: Diabetes mellitus.

Conclusions

DSME has been shown to improve knowledge, behavior, and self-management. To overcome many disorders associated with the care of type 2 DM patients, various forms of education for DM patients have been carried out such as using text messages, leaflets, illustrated pictures, or leaflets, through telephone, video, handbooks, or direct education. DSME intervention, in the previous studies, focused more on knowledge,

attitudes, foot care behavior, body weight, HbA1C, and glycemic control.

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