Jurnal Aisyah: Jurnal Ilmu Kesehatan

Volume 7, Issue 4, December 2022, p. 1123–1130
ISSN 2502-4825 (print), ISSN 2502-9495 (online)

Effectiveness of Empowerment-Based Diabetes Education on Diabetes Complication Prevention: A Systematic Review

Rondhianto Rondhianto[1], Siswoyo Siswoyo[2], Ahmad Fathoni[3]

[1,2,3] Faculty of Nursing, Universitas Jember

ARTICLE INFO

Article history:

Received 20 July 2022
Accepted 31 October 2022
Published 10 December 2022

Keyword:

Education
Empowerment
Diabetes Complications

A B S T R A C T

Diabetes mellitus is a chronic metabolic disease that requires continuous medical management and good self-care behavior. Failure in self-management will lead to complications and an increased risk of death. However, most patients do not have good self-management. One strategy to improve self-management is to conduct empowerment-based education, but its effectiveness is still unclearly. This study aims to identify the effectiveness of empowerment interventions in preventing diabetes complications. This study is a systematic review using the PRISMA protocol and JBI Critical Appraisal Tools to determine eligible articles. The articles search from five databases (PubMed, ProQuest, Science Direct, Google Scholar, and ClinicalKey for Nursing). Inclusion criteria were English, published 2012 - 2022, and experimental study. The study result showed that empowerment education could significantly increase knowledge and skills in people with diabetes so that patients can carry out self-management well, including HbA1c management, drug management, physical activity management, and diet management. Effective empowerment education interventions can reduce complications through increasing self-care behavior in diabetics, so educational interventions with empowerment can be used as an effort to prevent complications in people with diabetes mellitus

Kata kunci:

Edukasi
Pemberdayaan
Diabetes Komplikasi

**) corresponding author*

Dr. Rondhianto, S.Kep., Ns., M.Kep

Faculty of Nursing, Universitas Jember
Desa Kapuran RT 01 RW 01, Blok Pegadaian, Kecamatan Wonosari, Kabupaten Bondowoso, Jawa Timur – Indonesia 68282

Email: rondhianto@unej.ac.id

DOI: 10.30604/jika.v7i4.1308

A B S T R A K

Diabetes melitus merupakan penyakit metabolik kronik yang membutuhkan tatalaksana medis dan perilaku perawatan diri yang baik secara berkelanjutan. Kegagalan dalam pengelolaan mandiri akan menyebabkan komplikasi dan peningkatan resiko kematian, namun demikian sebagian besar penderita tidak memiliki pengelolaan mandiri dengan baik. Salah satu strategi untuk meningkatkan pengelolaan mandiri yaitu melakukan edukasi berbasis pemberdayaan, tetapi terkait dengan kefektivitasanya belum diketahui dengan pasti. Penelitian ini bertujuan untuk mengidentifikasi efektivitas intervensi pemberdayaan dalam mencegah komplikasi diabetes. Metode penelitian ini adalah systematic review dengan PRISMA protokol dan JBI Critical Appraisal Tools untuk menentukan artikel yang eligible. Database yang digunakan adalah Pubmed, ProQuest, Science Direct, Google Scholar, dan ClinicalKey for Nursing. Studi diterbitkan dalam Bahasa Inggris pada tahun 2012-2022 dengan tipe penelitian eksperimen. Hasil analisis studi menunjukkan bahwasanya edukasi pemberdayaan secara signifikan dapat meningkatkan pengetahuan dan keterampilan pada penderita diabetes, sehingga pasien mampu melakukan manajemen diri dengan baik meliputi manajemen HbA1c, manajemen obat, manajemen aktivitas fisik, dan manajemen diet. Intervensi edukasi pemberdayaan efektif dapat menurunkan komplikasi melalui peningkatan perilaku perawatan diri pada penderita diabetes,

sehingga intervensi edukasi dengan pemberdayaan dapat digunakan sebagai upaya pencegahan komplikasi pada penderita diabetes

INTRODUCTION

Diabetes mellitus is a chronic metabolic disease characterized by increased blood glucose in the long term, which can cause tissue damage, causing micro and macrovascular complications. Microvascular complications damage small blood vessels such as retinopathy, nephropathy, and neuropathy. Macrovascular complications cause damage to large blood vessels, thereby increasing the risk of hypertension, heart attack, stroke, impaired blood flow (especially blood flow to the legs), and delayed wound healing (International Diabetes Federation, 2021)

Diabetes mellitus is a chronic disease that suffers for life, so it is necessary to have good management on an ongoing basis to avoid complications of diabetes mellitus. Prevention of diabetic complications is essential. People with diabetes must comply with a diabetes regimen to prevent complications of diabetes mellitus. In addition to complying with a medical regimen, people with diabetes must have good self-management. However, there are still many people with diabetes who do not comply. It has an impact on the emergence of diabetes complications, both acute and chronic, which have an impact on their lives. The main factors that affect compliance are lack of knowledge and motivation (International Diabetes Federation, 2021; American Diabetes Association, 2021)

Diabetes mellitus is a non-communicable disease that continues to grow with a high mortality rate and is one of the priority diseases in the world. The prevalence of diabetes in adults aged 20-79 years has more than tripled, from about 151 million in 2000 (4.6%) to 537 million people (10.5%) in 2021. This number is estimated to increase to 643 million people in 2030 (11.3%) and 783 million (12.2%) in 2045. Increasing cases of diabetes mellitus caused an increase in cases of complications that cause death and disability (International Diabetes Federation, 2021). Previous studies state that more than half (59.7%) of diabetic patients had suffered from one or more complications (Belsti et al., 2019). The complications were neuropathy (45.6%), nephropathy (33.7%), retinopathy (20.7%), diabetic feet (29.9%), coronary heart disease (27.8%), and cerebrovascular (19.4%) (Corina, 2018; Saputri, 2020).

Diabetes management adequately can prevent diabetes complications. Improving the ability to manage diabetes through efforts to increase the knowledge and motivation of people with diabetes can prevent diabetes complications. A person's knowledge and motivation are closely related to preventing complications of diabetes mellitus. Increased knowledge and motivation in a person will improve the management of good self-management on an ongoing basis so that diabetics can make behavioral changes to prevent complications of diabetes mellitus (International Diabetes Federation, 2021). Knowledge and motivation in people with diabetes are needed to improve and change one's behavior to apply compliance behavior in preventing complications of diabetes mellitus (Belsti et al., 2020). Empowerment is one of the interventions to develop one's power by encouraging, motivating, and raising awareness of their potential so that people can survive and develop independently (Norris et al., 2015). Empowerment will motivate to foster individual attitudes and awareness to change their behavior (Xie et al., 2020).

Empowerment is a patient-centered collaborative approach that adapts to the fundamental realities of diabetes care. The patient's role is to be an active partner or well-informed collaborator in their care. The health professional's role is to help patients make informed decisions to achieve their goals and overcome barriers through education, appropriate treatment recommendations, expert advice, and support. The empowerment model includes several steps: (1) defining the problem and ascertaining the beliefs, thoughts, and feelings of patients that can support or hinder their efforts; (2) identifying long-term goals in which patients will work; (3) choosing and commit to making behavioral changes that can help to achieve their long-term goals; and (4) evaluate their efforts and identify what they have learned in the process (Funnell & Anderson, 2004).

Educational intervention with empowerment is an appropriate method to increase self-management and prevent complications. However, the results of several previous studies have contradictions related to its effectiveness. Some studies state that empowerment intervention is ineffective (Aquino et al., 2018; McCarrier et al., 2009; Sigurdardottir et al., 2009; Simmons et al., 2004), but other studies state that empowerment interventions are significantly effective for people with diabetes to prevent complications (Mogueo et al., 2021; Simamora et al., 2019; Rasnah et al., 2019). The authors are interested in finding and knowing how the effectiveness of diabetes education based on empowerment strategies is to prevent complications in people with diabetes.

METHOD

This study is a systematic review study that uses the PRISMA protocol. We used the JBI Critical Appraisal Tools to evaluate the risk of bias by assessing the methodological quality of the studies to be used by excluding low-quality studies. The study search used five databases (ProQuest, Science Direct, PubMed, ClinicalKey for Nursing, and Google Scholar) on April 3, 2022. We conducted a literature search published from 2012-2022. Search studies using keywords determined through Medical Subject Headings (MeSH) and Boolean operators (AND, OR, and NOT). The keywords used with Boolean Operators are ("Empowerment") AND ("Education") AND ("Diabetes mellitus" OR "Diabetes complications" OR "Glucose intolerance"). The inclusion and exclusion criteria were determined using the PICOS strategy: (1) patients with diabetes mellitus; (2) empowerment intervention; (3) comparison with other intervention or control group; (4) outcome explaining the effect of the empowerment intervention; (5) study design was a randomized controlled trial, case report, cohort study, and quasi-experimental studies. Four stages of search: (1) identification: entering keywords in five databases; (2) screening: filtering the articles using inclusion and exclusion criteria; (3) eligibility: articles assessment using JBI Critical Appraisal Tools by excluding articles below 50%; (4)

included: relevant and eligible articles. The articles were analyzed using meta-synthesis.

.

RESULTS AND DISCUSSION

We found 36,772 articles from 5 databases (ProQuest= 12,076, Science Direct= 4,417, PubMed= 472, ClinicalKey for Nursing= 10, and Google Scholar= 19,800). Articles were then filtered using PICOS inclusion and exclusion criteria and JBI critical assessment tool. Finally, 13 articles have passed the screening stage. The following is a detailed article selection process (Figure 1).

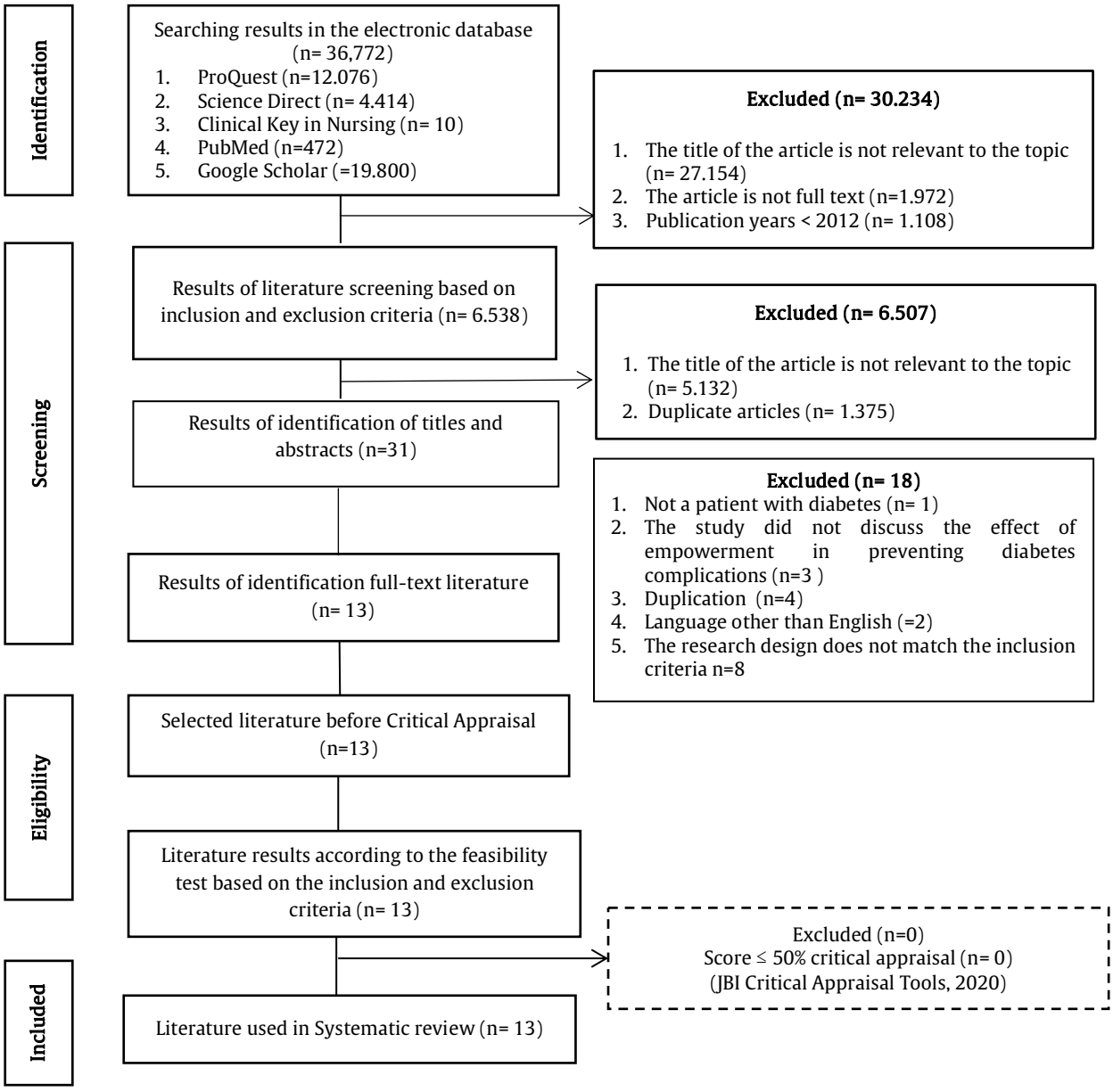

Figure 1. Diagram of Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)

Table 1. Characteristics or summary of findings from articles included in research on empowerment education interventions

No.	Penulis dan Tahun	Metode (DSVIA)	Hasil
1	(Azhdari Mamaghani et al., 2021)	D: Randomized Controlled Trials S: 156 respondent V: Empowerment with and without telenursing I: Diabetes Management Self-Efficacy Scale (DMSES) dan kadar HbA1c diukur dengan	Most respondents in this study were female, and the average age was 55. The study's results after the intervention for 14 weeks showed no significant difference in the control group's self-efficacy scores before and after the intervention (p=0.49). On the contrary, the self-efficacy scores increased significantly in both groups of empowerment interventions without and

		Kit BIONIK A: The data obtained were statistically analyzed in SPSS version 13, ANOVA test.	using telenursing (p =0.001).
2	(Souza et al., 2017)	D: Randomized Controlled Trials S: 145 respondent V: Diabetes self-care-based empowerment I: Diabetes Self Care Questionnaire (ESM) dan Diabetes Empowerment Scale-Short Form (DES-SF) A: Shapiro-Wilk test, paired t-test, and Mann-Whitney test	Most respondents were female, 76.5% of the intervention group and 65.8% of the control group. The mean age of the respondents was 56.1. The results showed a statistical increase in the median score on adherence to diabetes self-care practices (p=0.005) and empowerment scale (p=0.001).
3	(Cinar & Schou, 2014)	D: Randomized Controlled Trials S: 186 respondent V: Empowerment with Health Coaching (HC) I: The health behavior questionnaires, the Toothbrushing self-efficacy scale (TBSE), WHOQOL-Bref, dan test HbA1c A: Spearman and t-test sampel independen	In the intervention group (Health Coaching), 66% of patients brushed their teeth daily. In the control group, only 52% of patients (Health Education) did it daily. After the intervention, there was an improvement in oral health and diabetes-related variables in the HC group and only slightly increased in the HE group (P=0.05). Patients in the HC group were more likely to be physically active and have high self-efficacy than in the HE group (P=0.01). Self-efficacy against brushing (TBSE) correlated with favorable HbA1c levels (6.5%) in the HC group and quality of life (p=0.05) in both groups.
4	(Zamanzadeh et al., 2017)	D: Randomized Controlled Trials S: 66 respondent V: Empowerment of patients via telephone and short messages I: Diabetes Empowerment Scale (DES) A: Kolmogorov-Smirnov, t-test independen, t-test berpasangan and Chi-quadrat	The average age of the participants was 48 years, and the majority were female, with 60.6% in the intervention group and 57.6% in the control group. Empowerment through distance education by telephone and short messages showed a significant improvement in the psychosocial aspects of diabetic patients (p=<0.001), dissatisfaction and readiness to change (p=0.001), setting and achieving diabetes goals (p<0.001), and self-score. -empowerment was significantly higher in the intervention group compared to the control group (p=0.001)
5	(Shahabi et al., 2022)	D: Randomized Controlled Trials S: 60 respondent V: Empowerment based on telenursing I: Questionnaire of compliance with diet regimen by Mudanlo A: Kolmogorov-Smirnov, Chi-Squared, Mann Whitney U, Wilcoxon, and t-test	Most respondents were married, women, employees, had diplomas and bachelor's degrees, and the average age was 45. The assessment results showed that the mean and standard deviation of dietary adherence and its aspects increased after the intervention and was statistically significant (p=0.001). However, in the control group before and after the intervention, there was no significant difference in the final dimensions and adherence to the dietary regimen (p>0.05).
6	(Li et al., 2020)	D: Randomized Controlled Trials S: 225 responden V: Motivational Interview-based Empowerment Program (PEP) I: Patient Enablement Index (PEI), Problem Areas in Diabetes (PAID), HbA1c test, waist circumference, body mass index (BMI). A: T-test and Chi-quadrat	Most respondents are female and have higher education (65.8%). After the intervention for three months, there was a significant increase in the Problem Area in Diabetes (PAID) score and the Patient enablement index (PEI) score, increasing significantly in the intervention group. In contrast, there was only a slight change in the control group.
7	(Cortez et al., 2017)	D: Randomized Controlled Trials S: 238 respondent V: Empowerment Program I: The questionnaire that evaluates knowledge (DKN), The questionnaire about user attitudes (ATT), the self-care questionnaire (ESM), dan the short form empowerment scale (DES) A: Shapiro-Wilk and ANOVA	After the intervention, all groups had statistically significant reductions in scores for HbA1c, TC, LDL, DBP, and increased HDL (p<0.05), and all secondary outcomes (self-care, attitudes, knowledge, and empowerment) showed high scores. After the intervention, improvement occurred in both groups, but the improvement was better in the intervention group.
8	(Ramli et al., 2016)	D: Randomized Controlled Trials S: 836 respondent V: EMPOWER-PAR I: The site feasibility questionnaire (SFQ) and measurements of HbA1c, BP, BMI, and total cholesterol A: IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp., Armonk, NY, USA)	Results after one year of intervention showed mean changes in clinical outcomes. The intervention group showed a significant reduction in mean HbA1c compared to the control group (P = 0.003). Although both groups experienced a decrease in diastolic blood pressure, the decrease was more significant in the intervention group compared to the control group (P=0.02).
9	(Sugiyama et al., 2015)	D: Randomized Controlled Trials S: 516 respondent V: Self-management empowerment program I: Mental Component Summary Score (MCS-12) and HbA1c test A: Analysis using "mediation" software R2.14.0. Another analysis uses Stata	The average age of the respondents is 63 years, and the majority are female. MCS-12 or Mental Component Summary scores in patients showed an increase in the mean score of 1.4 points in the intervention group and a decrease of 0.2 points in the control group. In the causal media analysis, the intervention had a direct effect on increasing MCS-12 and indirectly changing HbA1c levels, social support, and perceived empowerment. The decrease in HbA1c in the intervention group was more

		Version 12.	significant than in the control group.
10	(Chen et al., 2015)	D: Randomized Controlled Trials S: 65 respondent V: Patient empowerment program I: Diabetes self-care scale, Diabetes Empowerment Scale, Diabetes Quality of Life Scale, and HbA1c test. A: SPSS 17 version (SPSS, Inc., Chicago, IL). t-test student and Chi-quadrat	Most respondents were female, and the average age of the patients was 62. The results showed that the intervention group experienced a significant decrease in glycosylated hemoglobin three months after the intervention compared to the control group and significantly improved self-care behavior, self-efficacy, and quality of life in the intervention group compared to the control group.
11	(Altshuler et al., 2016)	D: Randomized Controlled Trials S: 80 respondent V: Patient empowerment program I: Questionnaire of patient's health attitude and behavior. A: Shapiro-Wilk and Kolmogrov Smirnov	Participants have reported that after the intervention, many participants changed their behavior during clinic visits, resulting in a better quality of their visits, so that increasing diabetes self-management behavior will affect hemoglobin A1c (HbA1c) levels. Patients with low income can also accept empowerment interventions and low health knowledge and are suitable for use in various health clinics.
12	(Wong et al., 2015)	D: Cohort Study S: 27.278 respondent V: Patient empowerment program I: Measurement of patient clinical outcomes (HbA1c, BMI, LDL cholesterol, BP, and triglycerides). A: T-test and Chi quadrat	Subjects of PEP participants with non-PEP showed that patients with PEP had fewer CVD events than non-PEP patients, namely 352 CVD events in PEP participants from 13,639 subjects and 443 CVD events in non-PEP participants from 13,639 subjects. In addition to the incidence of CVD, patients with PEP have a lower risk of stroke, CHD, and heart failure when compared to non-PEP patients. This study showed that the incidence of stroke in PEP participants was 161 of 13,639 subjects compared to non-PEP patients, namely 230 participants out of 13,639 had a stroke. CHD is 156 (PEP): 178 (non-PEP), and heart failure 59 (PEP): 98 (non-PEP).
13	(Carlos K H Wong et al., 2014)	D: Cohort Study S: 2407 respondent V: Patient empowerment program I: Patient clinical outcome assessment (HbA1c, BP, LDL-C) A: T-test, Uji Chi-Square, and McNemar.	Compared with the non-PEP group, the PEP group achieved additional improvements in clinical outcomes over 12 months. A more significant percentage of patients in the PEP group achieved HbA1c#7% or LDL-C#2.6mmol/L at 12-month follow-up compared to the non-PEP group. The PEP group had an average of 0.812 fewer GOPC visits than the non-PEP group. The mean HbA1c value decreased significantly over time among the PEP groups. The PEP group experienced a decrease in HbA1c levels by an average of 0.138% (95% CI 20.252 to 20.024, with P value = 0.017) more than the non-PEP participants.

Based on the data presented above (n=13), there are two research study designs: the randomized control trial and the cohort study. Each study uses methods, instruments, and different outcome indicators. So, we use meta-synthesis or narrative to analyze the data (The JBI Manual for Evidence Synthesis, 2021).

All studies (n=13) analyzed had 32,258 respondents with diabetes mellitus. The average respondent is 55 years old, and the majority of respondents are female. All studies with various outcome measurement indicators showed that empowerment education significantly reduced complications through increasing self-care behavior in people with diabetes mellitus. Educational interventions with empowerment can significantly increase knowledge and skills in diabetics so that patients can carry out self-management well, including HbA1c management, drug management, physical activity management, and diet management.

DISCUSSION

People with diabetes mellitus will often experience complications that are influenced by gender and age. Most respondents are female. Females are at risk due to low physical activity and excess that can trigger diabetes mellitus (American Diabetes Association, 2020). Females also risk developing diabetes mellitus during pregnancy because females will experience an increase in estrogen and progesterone hormones, which can trigger an increase in insulin resistance. In addition, during pregnancy, females will experience an increase in the hormone human placental growth and human placental lactogen or human chorionic somatomammotropin, which can increase blood glucose levels and cause gestational diabetes (Perkumpulan Endokrinologi Indonesia, 2021).

The average age of respondents in the studies is 55 years. Age is one of the factors that influence the occurrence of diabetes mellitus, and the longer a person has diabetes, the greater the risk of person developing complications of diabetes mellitus (International Diabetes Federation, 2021). Most people with diabetes mellitus will experience chronic conditions at over 30 years (Souza et al., 2017). Complications of diabetes mellitus can attack individuals due to the increasing age and length of suffering from diabetes, which is accompanied by a decrease in the function of the human body, especially in the ability of pancreatic cells to produce insulin (International Diabetes Federation, 2021).

Outcome assessment indicators or parameters used to evaluate health outcomes and control diabetes mellitus, including HbA1c, anthropometry, blood pressure, and fat. Studies in a systematic review (n=13) showed significant results in reducing HbA1c levels, decreasing blood pressure, improving anthropometry, and improving fat levels. Diabetes empowerment programs can also significantly improve patients' physical, behavioral, and psychological outcomes. It can improve the quality of life in patients and can reduce complications in diabetic patients.

Empowerment programs can increase diabetes knowledge and make patients more responsible for their conditions. Patients can change their behavior such as diet habits, glucose control, and exercise to avoid complications of diabetes mellitus. Empowerment also can help people with diabetes take control of their lives. This educational intervention with empowerment is carried out by actively involving respondents to seek, choose, and set goals according to their conditions with the help of educators, namely professional health workers. Participation in empowerment education emphasizes that health professionals act as facilitators who encourage patients to participate in their diabetes control, such as finding solutions, setting goals, and making decisions independently according to their conditions (Funnell & Anderson, 2004)

Empowerment intervention using DSME showed a significant improvement in the control of stress management, provision of support, and the ability to make the right decisions in managing diabetes (Anderson, 1995; Funnell et al., 2010). DSME is an ongoing process to facilitate and enhance the knowledge, skills, and abilities needed for diabetes self-care (Funnell et al., 2010). Besides being given the knowledge and skills, DSME also adds emotional support to people with diabetes. Empowerment with DSMES is the development of a diabetes education program that is carried out collaboratively between people with diabetes and health professionals to control complications of diabetes mellitus (Funnell et al., 2007).

A previous study showed a significant effect of DSMES intervention on reducing stress and improving the quality of life in people with diabetes (Anggraeni et al., 2018; Wiastuti et al., 2017). DSMES is a structured diabetes education that provides support for patients in carrying out diabetes self-management on an ongoing basis to prevent complications of diabetes mellitus. Empowerment intervention will enhance patients' self-confidence to enhance self-efficacy, make the right decisions, gain support, reduce stress, change behavior, and improve HbA1c control (Funnell et al., 2007).

CONCLUSIONS AND SUGGESTIONS

Empowerment-based education is significantly effective for diabetics as an effort to prevent complications of diabetes mellitus. Empowerment education can be applied to people with diabetes to improve their knowledge and skill so that people with diabetes can carry out self-management well, including HbA1c management, drug management, physical activity management, and diet management. Effective empowerment education interventions can reduce complications through improving self-management in people with diabetes, so educational interventions with empowerment can be used as an effort to prevent complications in people with diabetes mellitus.

Funding

No funding was received for conducting this study.

REFERENCES

Altshuler, L., Plaksin, J., Zabar, S., Wallach, A., Sawicki, C., Kundrod, S., & Kalet, A. (2016). Transforming the Patient Role to Achieve Better Outcomes Through a Patient Empowerment Program: A Randomized Wait-List Control Trial Protocol. *JMIR Research Protocols*, *5*(2), e68. https://doi.org/10.2196/resprot.5376

American Diabetes Association. (2020). 8. Obesity Management for the Treatment of Type 2 Diabetes: Standards of Medical Care in Diabetes–2021. *Diabetes Care*, *44*(Supplement_1), S100–S110. https://doi.org/10.2337/dc21-S008

American Diabetes Association. (2021). 2. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes–2022. *Diabetes Care*, *45*(Supplement_1), S17–S38. https://doi.org/10.2337/dc22-S002

Anggraeni, A., Rondhianto, R., & Juliningrum, P. (2018). Pengaruh Diabetes Self-Management Education and Support (DSME/S) Terhadap Kualitas Hidup pada Pasien Diabetes Melitus Tipe 2. *Pustaka Kesehatan*, *6*(3), 453. https://doi.org/10.19184/pk.v6i3.11688

Aquino, J. A., Baldoni, N. R., Flôr, C. R., Sanches, C., Di Lorenzo Oliveira, C., Alves, G. C. S., Fabbro, A. L. D., & Baldoni, A. O. (2018). Effectiveness of individual strategies for the empowerment of patients with diabetes mellitus: A systematic review with meta-analysis. *Primary Care Diabetes*, *12*(2), 97–110. https://doi.org/10.1016/j.pcd.2017.10.004

Azhdari Mamaghani, H., Jabbarzadeh Tabrizi, F., Seyedrasooli, A., Sarbakhsh, P., Badri Gargari, R., Zamanzadeh, V., & Zanboori, V. (2021). Effect of Empowerment Program with and without Telenursing on Self-efficacy and Glycosylated Hemoglobin Index of Patients with Type-2 Diabetes: A Randomized Clinical Trial. *Journal of Caring Sciences*, *10*(1), 22–28. https://doi.org/10.34172/jcs.2021.001

Belsti, Y., Akalu, Y., & Animut, Y. (2020). Attitude, practice and its associated factors towards Diabetes complications among type 2 diabetic patients at Addis Zemen District hospital, Northwest Ethiopia. *BMC Public Health*, *20*(1), 785. https://doi.org/10.1186/s12889-020-08953-6

Belsti, Y., Akalu, Y., Fekadu, H., & Animut, Y. (2019). Awareness of complications of diabetes mellitus and its associated factors among type 2 diabetic patients at Addis Zemen District Hospital, northwest Ethiopia. *BMC Research Notes*, *12*(1), 1–8. https://doi.org/10.1186/s13104-019-4637-x

Chen, M.-F., Wang, R.-H., Lin, K.-C., Hsu, H.-Y., & Chen, S.-W. (2015). Efficacy of an empowerment program for Taiwanese patients with type 2 diabetes: A randomized controlled trial. *Applied Nursing Research : ANR*, *28*(4), 366–373. https://doi.org/10.1016/j.apnr.2014.12.006

Cinar, A. B., & Schou, L. (2014). Impact of empowerment on toothbrushing and diabetes management. *Oral Health & Preventive Dentistry*, *12*(4), 337–344. https://doi.org/10.3290/j.ohpd.a32130

Cortez, D. N., Macedo, M. M. L., Souza, D. A. S., Dos Santos, J. C., Afonso, G. S., Reis, I. A., & Torres, H. de C. (2017). Evaluating the effectiveness of an empowerment program for self-care in type 2 diabetes: a cluster randomized trial. *BMC Public Health*, *17*(1), 41. https://doi.org/10.1186/s12889-016-3937-5

Funnell, M. M, & Anderson, R. M. (2004). Empowerment and Self-Management of Diabetes. *Clinical Diabetes*, *22*(3), 123–127. https://doi.org/10.2337/diaclin.22.3.123

Funnell, Martha M., & Anderson, R. M. (2004). Empowerment and Self-Management of Diabetes. *Clinical Diabetes*, *22*(3), 123–127. https://doi.org/10.2337/diaclin.22.3.123

Funnell, Martha M., Brown, T. L., Childs, B. P., Haas, L. B., Hosey, G. M., Jensen, B., Maryniuk, M., Peyrot, M., Piette, J. D., Reader, D., Siminerio, L. M., Weinger, K., & Weiss, M. A.

(2010). National standards for diabetes self-management education. *Diabetes Care*, *34*(SUPPL.1), 89–96. https://doi.org/10.2337/dc11-S089

Funnell, Martha M, Brown, T. L., Childs, B. P., Haas, L. B., Hosey, G. M., Jensen, B., Maryniuk, M., Peyrot, M., Piette, J. D., Reader, D., Siminerio, L. M., Weinger, K., & Weiss, M. A. (2010). National standards for diabetes self-management education. *Diabetes Care*, *32 Suppl 1*(Suppl 1), S87-94. https://doi.org/10.2337/dc09-S087

Funnell, Martha Mitchell, Tang, T. S., & Anderson, R. M. (2007). From DSME to DSMS: Developing empowerment-based diabetes self-management support. *Diabetes Spectrum*, *20*(4), 221–226. https://doi.org/10.2337/diaspect.20.4.221

International Diabetes Federation. IDF Diabetes Atlas 10th edn. Brussels, Belgium: 2021. Available at: https://www.diabetesatlas.org

Li, Z., Chen, Q., Yan, J., Liang, W., & Wong, W. C. W. (2020). Effectiveness of motivational interviewing on improving Care for Patients with type 2 diabetes in China: A randomized controlled trial. *BMC Health Services Research*, *20*(1), 57. https://doi.org/10.1186/s12913-019-4776-8

McCarrier, K. P., Ralston, J. D., Hirsch, I. B., Lewis, G., Martin, D. P., Zimmerman, F. J., & Goldberg, H. I. (2009). Web-based collaborative care for type 1 diabetes: a pilot randomized trial. *Diabetes Technology & Therapeutics*, *11*(4), 211–217. https://doi.org/10.1089/dia.2008.0063

Mogueo, A., Oga-Omenka, C., Hatem, M., & Kuate Defo, B. (2021). Effectiveness of interventions based on patient empowerment in the control of type 2 diabetes in sub-Saharan Africa: A review of randomized controlled trials. *Endocrinology, Diabetes & Metabolism*, *4*(1), e00174. https://doi.org/10.1002/edm2.174

Norris, S. L., Lau, J., Smith, S. J., Schmid, C. H., & Engelgau, M. M. (2015). Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. *Diabetes Care*, *25*(7), 1159–1171. https://doi.org/10.2337/diacare.25.7.1159

Perkumpulan Endokrinologi Indonesia. P*edoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia 2021*. Jakarta: PB PERKENI, 2021.

Ramli, A. S., Selvarajah, S., Daud, M. H., Haniff, J., Abdul-Razak, S., Tg-Abu-Bakar-Sidik, T. M. I., Bujang, M. A., Chew, B. H., Rahman, T., Tong, S. F., Shafie, A. A., Lee, V. K. M., Ng, K. K., Ariffin, F., Abdul-Hamid, H., Mazapuspavina, M. Y., Mat-Nasir, N., Chan, C. W., Yong-Rafidah, A. R., … Low, W. H. H. (2016). Effectiveness of the EMPOWER-PAR Intervention in Improving Clinical Outcomes of Type 2 Diabetes Mellitus in Primary Care: A Pragmatic Cluster Randomised Controlled Trial. *BMC Family Practice*, *17*(1), 157. https://doi.org/10.1186/s12875-016-0557-1

Rasnah, R., Sjattar, E. L., & Yusuf, S. (2019). Efektifitas Pemberdayaan Keluarga Terhadap Kontrol Metabolik Pada Pasien Diabetes Mellitus Tipe 2. *Jurnal Keperawatan Muhammadiyah*, *4*(2). https://doi.org/10.30651/jkm.v4i2.3067

Saputri, R. D. (2020). Komplikasi Sistemik Pada Pasien Diabetes Melitus Tipe 2. *Jurnal Ilmiah Kesehatan Sandi Husada*, *11*(1), 230–236. https://doi.org/10.35816/jiskh.v11i1.254

Shahabi, N., Kolivand, M., Salari, N., & Abbasi, P. (2022). The effect of telenursing training based on family-centered empowerment pattern on compliance with diet regimen in patients with diabetes mellitus type 2: a randomized clinical trial. *BMC Endocrine Disorders*, *22*(1), 36. https://doi.org/10.1186/s12902-022-00953-4

Sigurdardottir, A. K., Benediktsson, R., & Jonsdottir, H. (2009). Instruments to tailor care of people with type 2 diabetes. *Journal of Advanced Nursing*, *65*(10), 2118–2130. https://doi.org/10.1111/j.1365-2648.2009.05040.x

Simamora, F. A., Siregar, H. R., Keperawatan, P. S., Aufa, U., Padangsidimpuan, R., Diri, A. P., & Triyanto, P. (2019). EFEKTIVITAS MODEL PEMBERDAYAAN DIRI TERHADAP AKTIVITAS PERAWATAN DIRI KLIEN DIABETES MELITUS TIPE 2. *Jurnal Education and Development Institut Pendidikan Tapanuli Selatan*, *7*(4), 6–9.

Simmons, D., Gamble, G. D., Foote, S., Cole, D. R., & Coster, G. (2004). The New Zealand Diabetes Passport Study: a randomized controlled trial of the impact of a diabetes passport on risk factors for diabetes-related complications. *Diabetic Medicine : A Journal of the British Diabetic Association*, *21*(3), 214–217. https://doi.org/10.1111/j.1464-5491.2004.01047.x

Souza, D. A. S., Reis, I. A., Cortez, D. N., De Souza Afonso, G., & De Carvalho Torres, H. (2017). Evaluation of home visits for the empowerment of diabetes self-care. *ACTA Paulista de Enfermagem*, *30*(4), 350–357. https://doi.org/10.1590/1982-0194201700052

Sugiyama, T., Steers, W. N., Wenger, N. S., Duru, O. K., & Mangione, C. M. (2015). Effect of a community-based diabetes self-management empowerment program on mental health-related quality of life: a causal mediation analysis from a randomized controlled trial. *BMC Health Services Research*, *15*, 115. https://doi.org/10.1186/s12913-015-0779-2

The JBI Manual for Evidence Synthesis (Issue April). (2021). https://doi.org/https://synthesismanual.jbi.global. https://doi.org/10.46658/JBIMES-20-01

Wiastuti, S. M., Rondhianto, R., & Widayati, N. (2017). Pengaruh Diabetes Self Management Education and Support (DSME/S) Terhadap Stres Pada Pasien Diabetes Melitus (DM) Tipe 2 Di Wilayah Kerja Puskesmas Patrang Kabupaten Jember (The Effect of Diabetes Self-Management Education and Support [DSME/S] on Stress i. *Pustaka Kesehatan*, *5*(2), 268–275. https://jurnal.unej.ac.id/index.php/JPK/article/view/5784

Wong, C. K. H., Wong, W. C. W., Wan, Y. F., Chan, A. K. C., Chung, K. L., Chan, F. W. K., & Lam, C. L. K. (2015). Patient Empowerment Programme in primary care reduced all-cause mortality and cardiovascular diseases in patients with type 2 diabetes mellitus: a population-based propensity-matched cohort study. *Diabetes, Obesity & Metabolism*, *17*(2), 128–135. https://doi.org/10.1111/dom.12397

Xie, Z., Liu, K., Or, C., Chen, J., Yan, M., & Wang, H. (2020). An examination of the socio-demographic correlates of patient adherence to self-management behaviors and the mediating roles of health attitudes and self-efficacy among patients with coexisting type 2 diabetes and hypertension. *BMC Public Health*, *20*(1), 1227. https://doi.org/10.1186/s12889-020-09274-4

Zamanzadeh, V., Zirak, M., Hemmati Maslakpak, M., & Parizad, N. (2017). Distance education and diabetes empowerment: A single-blind randomized control trial. *Diabetes & Metabolic Syndrome*, *11 Suppl 1*, S247–S251. https://doi.org/10.1016/j.dsx.2016.12.039

 ISSN 2502-4825 (print), ISSN 2502-9495 (online)