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Research Article

The Effect of Diabetes Self-Management Education on Self-Empowerment of Patients with Type 2 Diabetes Mellitus in the Susut I Public Health Center

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ABSTRACT

Introduction: The continuing rise in diabetes mellitus (DM) cases suggests that disease management among people with DM remains suboptimal. Limited confidence to perform self-care (self-empowerment) may contribute to poor management. Diabetes Self-Management Education (DSME) is expected to strengthen empowerment by improving knowledge, skills, and problem solving.

Objective: To determine the effect of DSME on self-empowerment among patients with type 2 DM in the working area of Susut I Community Health Center.

Methods: A pre-experimental one-group pretest–posttest design was used. Respondents received DSME in four sessions. From a population of 93 patients, 22 respondents were selected by purposive sampling. Self-empowerment was measured using the Diabetes Empowerment Scale (DES). Pre- and post-intervention scores were compared using the Wilcoxon Signed-Rank Test at $\alpha = 0.05$.

Results: Before DSME, most respondents had moderate self-empowerment (16/22; 72.73%), and the remainder had low self-empowerment (6/22; 27.27%). After DSME, most respondents remained in the moderate category (17/22; 77.27%), while five respondents (22.73%) reached good self-empowerment. The Wilcoxon analysis showed a significant improvement after the intervention ($p = 0.001$; $p < 0.05$).

Conclusion: DSME significantly increases self-empowerment in people with type 2 DM. Appropriate education can enhance patients' confidence to make informed decisions, broaden understanding to support new perspectives, and increase willingness and readiness to prevent complications through meal planning, regular physical activity, and consistent medication adherence, thereby supporting better well-being and sustained empowerment. These findings support integrating structured DSME into routine primary care services and regular follow-up to help maintain and reinforce ongoing empowerment gains over time.

Keywords: *Diabetes Mellitus, Self-Management Education, Self-Empowerment*

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Background

Diabetes mellitus (DM) is one of the most common chronic diseases worldwide. If not properly managed, diabetes mellitus can lead to numerous complications, including heart disease, kidney disease (nephropathy diabetic), eye disorders (retinopathy diabetic), and nerve problems (neuropathy diabetic) [1]. The four pillars of diabetes management that individuals with diabetes must adhere to include dietary regulation, education, physical activity, and medication therapy. However, in practice, many diabetes patients still struggle to implement these strategies effectively or consistently [2]. *International Diabetes Federation* (IDF) reported that 537 million adults aged 20-79 years, or 1 in 10 people worldwide, are living with diabetes. The country with the highest number of diabetes cases is China, with 140.87 million cases in 2021, followed by India with 74.2 million and Pakistan with 33 million. Indonesia ranks fifth as the country with the highest number of diabetes cases, with 19.47 million individuals affected [3]. Data collected by the Bali Provincial Health Office in 2023 revealed that the prevalence of diabetes mellitus, based on doctor diagnoses across all age groups, amounted to 30,856 cases in the province of Bali [4].

The increasing number of diabetes mellitus cases each year indicates the suboptimal management of the disease by individuals with diabetes. A study conducted by the Department of Medicine at the Rawal Institute of Health Sciences in Islamabad, involving 183 type 2 diabetes mellitus patients, revealed that 114 respondents (62%) fell into the non-compliance category, 76 respondents (41.5%) had insufficient knowledge about diabetes mellitus, and 149 respondents (81.4%) did not perform glycemic control [5]. According to a study conducted by Hidayah (2019), diabetes management in the areas of physical activity, self-care, and blood sugar monitoring among individuals with diabetes remains poor, with respective percentages of 54.4%, 84.4%, and 82.3%. One contributing factor to this issue is the low level of patient confidence in performing self-care for their diabetes management. [6] This confidence, also referred to as self-empowerment, is an individual's ability to use their available resources to meet their own needs and maintain optimal health. [6].

Diabetes patients with good self-empowerment are better able to take responsibility for managing their own lives, enabling them to select and implement the best care for their condition [6]. Self-empowerment also enables patients to understand various aspects that can improve their quality of life, such as understanding health goals, building confidence in healthcare practices, making independent choices to improve their health, and recognizing whether the health actions they take have positively impacted their overall health. This understanding can help patients better control their health behaviors, thereby improving their diabetes management and ultimately enhancing their quality of life [7].

Education is one of the effective pillars for enhancing self-empowerment in individuals with diabetes mellitus. Providing appropriate education that aligns with the cultural context and the audience's age range ensures the material is well-received. This approach can have a significant impact on increasing knowledge and self-awareness in type 2 diabetes patients, enabling them to manage their health independently and control their condition more effectively [8]. The study conducted by Syatriani et al. (2023) found a significant relationship between knowledge and self-empowerment among type 2 diabetes patients ($p = 0.036$), which is less than 0.05. It is recommended that type 2 diabetes patients enhance their self-empowerment by improving their knowledge to understand their strengths and weaknesses, setting goals they want to achieve, and building confidence in their ability to manage their diabetes, ultimately leading to a better quality of life [7].

The continuous actions taken to provide knowledge, skills, and abilities to patients with diabetes mellitus to enable them to manage their care independently are referred to as Diabetes Self-Management Education (DSME) [9]. Education through Diabetes Self-Management Education (DSME) is believed to enhance self-empowerment among patients with diabetes. This approach aims to support decision-making, self-care practices, problem-solving, and active collaboration with healthcare providers to improve health outcomes, quality of life, and prevent complications in patients [10]. The American Diabetes Association (ADA) states that Diabetes Self-Management Education (DSME), when tailored to cultural contexts and focused on empowering individuals with diabetes, helps achieve optimal health, improves quality of life, and reduces healthcare costs [11]. The preliminary study conducted by the researcher on September 2, 2024, at Susut I Health Center revealed 93 cases of diabetes mellitus in the health center's working area. Interviews with the non-communicable disease (NCD) program coordinator at Susut I Health Center showed that approximately 36 individuals with diabetes mellitus, as recorded in the patient data, do not regularly undergo disease control at the health center.

Based on the case description and the identified problem, the researcher feels the need to conduct a study titled "The Effect of Diabetes Self-Management Education on Self-Empowerment of Type 2 Diabetes Patients in the Susut I Public Health Center Working Area.

Method

Study design

This study is a pre-experimental research, aimed at determining whether there is an effect of Diabetes Self-Management Education on the self-empowerment of respondents in a single treatment group without the presence of a control or comparison group. The study was conducted from November 9 to 21, 2024, in the working area of Susut I Health Center. The population in this study consists of all diabetes mellitus patients recorded in the working area of Susut I Health Center, totaling 93 individuals. The sample is a subset of the population selected systematically or based on specific criteria to be analyzed in the study [12].

Sample

The sample size in this study is 22 individuals, selected using the purposive sampling technique in which the researcher determined the participants based on predefined inclusion and exclusion criteria and in accordance with the theory proposed by Sugiyono, which states that for simple experimental research, a sample size of 20–30 participants is considered sufficient [13].

Instruments

Data collection was carried out using the Diabetes Empowerment Scale (DES) questionnaire, which has been tested for validity and reliability. In quantitative research, validity refers to the degree of accuracy and precision of an instrument in measuring what it is intended to measure [14]. The results obtained show that the calculated r value ranges from 0.524 to 0.826, which is higher than the table r value (0.514), and the Cronbach's alpha value is 0.819, indicating reliability. The DES questionnaire comprises three key assessed domains: the management of psychosocial aspects in individuals with diabetes mellitus, the evaluation of dissatisfaction and readiness to change, and the establishment and achievement of personal goals related to diabetes management. Each domain consists of six statements, resulting in a total of 18 items in the questionnaire.

Data collection

The pretest questionnaire was completed using paper and writing tools, supervised and facilitated by the researcher and enumerators at the Banjar Susut Kaja hall. The respondents were then provided with four sessions of DSME education at the Banjar Susut Kaja hall and via Zoom meetings. The DSME (Diabetes Self-Management Education) intervention consisted of four main topics. In the first session, the researcher delivered material on the definition and causes of type 2 diabetes mellitus, its signs and symptoms, as well as risk factors and preventive strategies. The second session focused on the importance of physical activity for individuals with diabetes mellitus, including recommended types of exercise along with appropriate frequency and intensity. In the third session, the researcher provided information on the significance of dietary management, covering nutritional composition, examples of daily menus, eating patterns, and an explanation of the glycemic index of foods and beverages, which is essential knowledge for individuals with diabetes. The fourth session addressed the importance of foot care and foot exercises for individuals with diabetes mellitus, including guidance on how to properly perform foot exercises at home.

Finally, a posttest was conducted at the Banjar Susut Kaja hall. Data collection was carried out by gathering all respondents at a single location, with the support of enumerators. Data collection was conducted directly at the Susut Kaja community hall using paper-based questionnaires and pens provided by the researcher. An informed consent form was presented at the beginning of the questionnaire, and only individuals who agreed to participate were allowed to proceed. The data collection process was carried out with approval from the Bangli District Government and the ethics committee, and was supported by two enumerators (one non-communicable disease program officer from Susut I Primary Health Center and one university student), in accordance with procedures agreed upon by the village authorities, the primary health center, and the enumerators. Respondents were selected using purposive sampling. Selected respondents were asked to complete the questionnaire at the Susut Kaja community hall within 15–20 minutes.

Data analysis

The data analysis used a non-parametric analysis with the Wilcoxon Signed Rank Test.

Ethical considerations

The researcher explained the purpose, filling instructions, and assured data confidentiality, anonymity, and the right to refuse participation without consequence. Research ethics were applied by ensuring that all participants provided consent after a clear explanation (informed consent), and that all data collected were used solely for academic purposes. Ethical approval was granted by the Health Research Ethics Committee of STIKES Wira Medika Bali No. 352/E1.STIKESWIKA/EC/X/2024 and by the Bangli Regency Government Administration No. 071/136/X/DPMPTSP.

Results and Discussion

Based on Table 1, it was found that out of 22 respondents, the majority were female, with 15 individuals (68.18%). The majority were aged between 44-55 years, with 14 individuals (63.64%). All respondents (100%) were married. The majority had completed their education at the high school level, with 11 individuals (50%). Most were employed in private sector jobs, with 9 individuals (40.91%). The majority had been living with diabetes mellitus for 1-5 years, with 14 individuals (63.64%). Finally, 13 individuals (59.1%) had a normal body mass index (BMI).

Table 2 shows that before receiving Diabetes Self-Management Education (DSME), the majority of the study respondents had self-empowerment in the moderate category, with 16 individuals (72.73%), while the remaining 6 individuals (27.27%) were in the low category.

Table 3 shows that after the implementation of DSME, all respondents experienced an increase in self-empowerment scores. The majority of respondents fell into the moderate category, with 17 individuals (77.27%), and the remaining 5 individuals (22.73%) were categorized as having high self-empowerment.

Based on the research findings, it was found that out of 22 respondents, the majority were female (15 individuals, 68.18%), aged 44-55 years (14 individuals, 63.64%), married (22 individuals, 100%), with the highest education being high school (11 individuals, 50%), working as private sector employees (9 individuals, 40.91%), had been living with diabetes mellitus for 1-5 years (14 individuals, 63.64%), and had a normal body mass index (BMI) (13 individuals, 59.1%). The study conducted in the working area of Puskesmas Susut I showed that before the DSME intervention, the majority of respondents had moderate self-empowerment levels (16 individuals, 72.73%), while the remaining had low self-empowerment levels (6 individuals, 27.27%). This is in line with the study conducted by Ariyanti (2012) entitled "Changes in Self-Empowerment of Type 2 Diabetes Mellitus Patients with a Diabetes Self-Management Education Approach at Puskesmas Kebonsari Surabaya," where out of 20 respondents, the majority had moderate self-empowerment levels, with 19 individuals (95%)[15].

Table 1. The characteristics of the respondents based on gender, age, marital status, education, occupation, duration of diabetes mellitus, and body mass index (BMI)

Characteristic	Category	Frequency	Precentage (%)
Gender	Male	7	31,82%
	Female	15	68,18%
	Total	**22**	**100%**
Age	17-25 Years	0	0%
	26-35 Years	0	0%
	36-45 Years	4	18,18%
	46-55 Years	14	63,64%
	56-65 Years	4	18,18%
	>65 Years	0	0%
	Total	**22**	**100%**
Marital Status	Unmarried	0	0%
	Married	22	100%
	Divorce	0	0%
	Total	**22**	**100%**
Education	Elementary School	1	4,55%
	Junior High School	8	36,36%
	Senior High School	11	50%
	Higher education	2	9,09%
	Total	**22**	**100%**
Occupation	Farmer	4	18,18%
	Government employee	5	22,73%
	Private sector employee	9	40,91%
	Housewife	4	18,18%
	Unemployed	0	0%
	Retiree	0	0%
	Total	**22**	**100%**
Duration of Diabetes Mellitus	1-5 Years	14	63,64%
	>5 Years	8	36,36%
	Total	**22**	**100%**
Body Mass Index	Underweight	1	4,5%
	Normal	13	59,1%
	Overweight	2	9,1%
	Obesity	6	27,3
	Total	**22**	**100%**

Table 2. The Pre-Posttest Results of Respondents with the Diabetes Empowerment Scale (DES) Questionnaire

No	**Self Empowerment**	**Results**	
		Pre	**Post**
1	Poor	6 (27.7%)	0
2	Fair	16 (72.73%)	17 (77,27%)
3	Good	0	5 (22.73)
	Total	**22**	**100%**

The elements of self-empowerment in patients with diabetes mellitus include psychosocial aspects of diabetes, assessment of dissatisfaction and readiness for change, and the patient's ability to set diabetes-related goals. These three elements are related to personal factors that diabetes mellitus patients possess, such as age and gender [16]. This aligns with the data from this study, in which the majority of respondents with moderate self-empowerment were in the 46-55 age range (12 individuals), and the majority of respondents with low self-empowerment were in the 56-65 age range (4 individuals). This indicates that age plays a role in an individual's ability to control their decision-making when selecting healthcare. Individuals in the pre-senior or senior age groups may experience cognitive limitations in analyzing the best options for their health and limited physical ability to seek care at healthcare facilities. Furthermore, individuals aged 56-65 years often begin to experience difficulties with activities, limiting the information they can receive. In contrast, individuals in the 46-55 age range tend to be more willing to seek information about their disease. With the information obtained, they are able to choose their own treatment, thus achieving the desired health outcomes [17].

The researcher believes that, in addition to age and gender, other factors also play an important role in self-empowerment. Cultural factors, particularly in Bali such as *tedun*, *sangkep*, and *ngayah*, also have a role in an individual's self-empowerment. Religious and community activities in Bali are generally mandatory for people of productive age, particularly those aged 46-55. This allows them to gain much information from their community, including health-related information. If a person in the productive age group does not participate in community activities in their neighborhood, they are usually subject to both material and social sanctions from the community. As a result, individuals are compelled to participate in these community activities, which opens doors to broader information. This access to information motivates and encourages them to take action, including managing their own health independently.

The results of the study, after the implementation of DSME, showed that the respondents' overall self-empowerment increased. The majority of respondents (17, 77.27%) fell into the moderate category, and the remaining respondents (5, 22.73%) fell into the good category. This aligns with the study conducted by Ariyanti (2012) entitled *"Changes in Self-Empowerment of Type 2 Diabetes Mellitus Patients with a Diabetes Self-Management Education Approach at Puskesmas Kebonsari Surabaya,"* which reported that out of 10 respondents involved in the study, all of them experienced an increase in self-empowerment after receiving DSME intervention [15].

According to Edgar Dale (1994) in Nursalam and Effendi (2008), providing DSME education using print media that includes images will increase the target's ability to recall the information given by 30%. Educational videos and booklets are part of print media, and in this educational video, the DSME materials are explained from session 1 to session 4. Respondents can watch this educational video again after the researcher explains it, allowing them to recall the information. This can lead to improved respondents' self-empowerment, enabling them to better remember and understand the materials presented by the researcher [18].

The researcher believes that providing DSME through educational video media is among the most effective DSME models. The use of educational video media in DSME can provide stimuli through audio and images, which prevents respondents from feeling bored during the delivery of the material. This is because the education is not just a typical counseling session but also includes an element of entertainment for the respondents. The result is reflected in the post-test self-empowerment outcomes, where all respondents still remember most of the material presented, leading to higher post-test scores than pre-test scores overall. On average, diabetics understand where they can get support and motivation after undergoing DM treatment, whether from family, healthcare professionals, or from within themselves. The diabetics understand and can express their feelings about DM and their impressions during and after receiving DM treatment. The respondents also understand the challenges they may face that could hinder their own DM care and are now able to map out alternative solutions to overcome the obstacles they encounter while managing their DM care.

The researcher also believes that the increase in self-empowerment levels after the implementation of DSME indicates the effectiveness of this educational program in equipping respondents with the knowledge, skills, and support necessary to manage diabetes independently. DSME enables DM patients not only to understand the technical aspects of diabetes management, such as diet, physical activity, and foot care, but also to recognize and express their emotions related to the journey of this illness. This is important because managing diabetes is not only a physical issue but also a mental and emotional one. Additionally, with an increased understanding of available sources of support, whether from family, healthcare professionals, or themselves, diabetics become more confident in facing challenges and obstacles that may arise. They are also better prepared to identify and address barriers to care, such as difficulties following treatment routines or emotional challenges. In conclusion, DSME not only enhances the technical capacity of DM patients but also strengthens the psychosocial aspects critical to long-term success in diabetes management. The research results regarding the impact of DSME on self-empowerment of type 2 diabetes patients in the working area of Puskesmas Susut I show that there is an effect of DSME implementation on self-empowerment of diabetes patients in the working area of Puskesmas Susut I, as evidenced by the results of the Wilcoxon signed rank test analysis with a p-value of 0.001 ($p < \alpha$; $\alpha = 0.05$). This result is in line with the findings of a study conducted by Putri R. A., Kusnanto, Eppy S. (2018) in their research titled "The Effect of Diabetes Self-Management Education with a Spiritual Approach on Self-Empowerment in Type 2 Diabetes Patients in the Working Area of Puskesmas Jagir Surabaya," where the analysis with ANOVA showed a difference in self-empowerment between the control and intervention groups ($p = 0.003$) [19].

Diabetes patients need to have the ability to identify unsatisfactory aspects of their care and be able to determine their readiness to modify their diabetes care plan, such as the readiness and awareness to have routine health check-ups at healthcare facilities as scheduled, the awareness to engage in regular physical activity, maintaining a healthy diet, and managing stress related to diabetes, which will only worsen the condition. These goals will only succeed if there is a willingness, commitment, and intention among diabetic patients to carry out efforts to increase their knowledge and overcome existing obstacles, thereby improving their self-empowerment. Patients with diabetes who are unable to change may face obstacles that are difficult to overcome, such as unhealthy lifestyles like consuming high-cholesterol foods or having a busy schedule that limits their time for physical activity. These challenges can lead to stress related to their diabetes, making it difficult for them to change habits and maintain commitment regarding their health choices [16].

The significant increase in empowerment among all respondents was driven by recognition and awareness within the respondents themselves. The diabetics acknowledged that they are living with diabetes and understood that it is a chronic condition that cannot be cured. Diabetic patients made efforts to take responsibility for what they can and cannot do, based on their resources and abilities, as well as their willingness and awareness regarding diabetes management. However, for some diabetes patients, this was difficult to implement, leading to prolonged stress. Therefore, stress management and the way diabetic patients view their illness need to be changed to ensure successful diabetes management. Providing appropriate education can help diabetics become more confident in making the best decisions for themselves and expand their knowledge, fostering new mindsets. This can increase their motivation and willingness to prevent complications, plan their meals, engage in regular physical activity, and take their medication consistently. Such changes can guide diabetes patients toward a healthier and more empowered state [6].

In the 36-55 age range, a person's cognitive development is still progressing quite well. One factor that influences self-empowerment is the level of education a person has completed. However, awareness, willingness, and the duration of having diabetes mellitus (DM) also play significant roles in influencing self-empowerment in DM patients. A person with a higher level of education is theoretically expected to have higher self-empowerment. However, in this study, respondents with higher education and those with lower education both had moderate self-empowerment. This could be because the duration of living with DM is another important factor affecting the independence of DM patients in managing their disease. The results show that self-empowerment is not solely influenced by education level but also by factors such as illness duration.

The study on the effect of implementing DSME on self-empowerment in the respondent group found a significant impact. In the first session, all respondents took a pre-test, which was followed by the implementation of DSME. Respondent 19 showed the greatest improvement in self-empowerment among the others. This was due to the respondent's willingness and cooperativeness in learning about their strengths and weaknesses and in changing their lifestyle to achieve optimal health. Although at times this respondent felt bored with managing DM, they remained committed to managing their disease as best as possible

In the discussion on diabetes in general, most respondents acknowledged that the symptoms explained in the video were also experienced by them. Additionally, the majority of respondents gained knowledge of the potential complications that may arise if their condition is not well controlled. The second session focused on physical activities beneficial for people with diabetes. Some respondents reported rarely engaging in physical activity due to their busy daily routines. However, after the session, these respondents expressed their willingness to dedicate 15-30 minutes a day to exercise to better manage their condition. The third session covered the proper management of diet for individuals with diabetes. In this session, some respondents still hadn't implemented proper dietary practices in their daily routines. They tended to consume whatever food was available that day, often in varying portions. The respondents also learned about the glycemic index of foods after receiving the educational material. As a result, they now feel more confident in choosing which foods are good for them to eat and which to avoid.

In the fourth session, which covered foot exercises for diabetes and their importance, the respondents reported that they had previously been exposed to information about these exercises but had rarely practiced them at home. This was because they found the exercises tiring and time-consuming. However, after being informed about the benefits of foot exercises for diabetes and their importance, the respondents developed a willingness to engage in the exercises, even though some movements were still occasionally forgotten. They expressed their commitment to performing diabetes foot exercises to achieve the optimal health quality they desire.

The researcher argues that essentially, each individual has different skills and desires. Some may understand but are unable to implement things independently; others may understand and be capable of doing so but fail to apply it in their daily lives; and some may not yet understand how to manage diabetes. The ability to think, based on knowledge and insight, to find solutions to the problems they face is called cognitive ability.

Most diabetic patients obtain information about diabetes from healthcare professionals, the internet, and television. Diabetic patients with high levels of knowledge and a higher educational background tend to have greater self-empowerment and can quickly find solutions to the problems they encounter. Additionally, cultural factors play an important role in enhancing self-empowerment among diabetic patients. A community with a strong culture of social activity can expose individuals to a great deal of information, including health-related information, which can significantly influence their self-empowerment.

Limitations

This study had a limitation concerning the duration of the Diabetes Self-Management Education (DSME) intervention. The initial plan was to conduct the intervention over a two-week period, however due to time constraints and field conditions such as numerous community activities and religious ceremonies taking place at the time, the intervention could only be carried out over a span of eight days

Implication

Following the findings that the provision of Diabetes Self-Management Education (DSME) positively influences the self-empowerment of individuals with diabetes mellitus, it is recommended that individuals with diabetes develop a daily care plan. This plan should include regular blood glucose monitoring, medication adherence, healthy dietary practices, and physical activity, all of them should be documented consistently on a daily basis. Participation in regular educational sessions provided by primary healthcare centers or diabetes communities, as well as consultations with healthcare professionals, is also essential to strengthen understanding and skills in diabetes management. Furthermore, individuals with diabetes are encouraged to seek social support from family members or community groups to maintain motivation. Accessing information from credible sources regarding diabetes mellitus can enhance disease-related literacy and further support the development of self-empowerment, ultimately contributing to improved quality of life for individuals living with diabetes.

Conclusion

The provision of Diabetes Self-Management Education (DSME) has been proven to have a significant impact on the self-empowerment of respondents with type 2 diabetes in the working area of Puskesmas Susut I. The results of the Wilcoxon Signed Ranks Test showed that $p < 0.05$, specifically 0.001. This result indicates that the implementation of DSME has an effect on the self-empowerment of patients with type 2 diabetes in the working area of Puskesmas Susut I.

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