Proceeding of the International Conference on Health Sciences and Nursing
Vol. 1, No. 2, 2024
Pages 142-151
Available Online at: https://prosiding.arikesi.or.id/index.php/ICHSN

Effectiveness of Diabetes Self-Management Education (DSME) and Family Support in Preventing Diabetic Foot Ulcers

Diana Dayaningsih [1]; **Margiyati Margiyati** [2]
[1,2] Nursing, STIKES Kesdam IV/Diponegoro, Semarang, Indonesia
E-mail: diana.day84@gmail.com [1]; margi@stikeskesdam4dip.ac.id [2]

Abstract

Background: Diabetes Mellitus is a chronic disease that requires comprehensive management involving both patients and their families. Diabetes Self-Management Education (DSME) is a crucial strategy for empowering patients and preventing complications, particularly diabetic foot ulcers. This study aimed to evaluate the effectiveness of DSME, combined with family support, in preventing diabetic foot ulcers. Methods: A quasi-experimental, one-group pre- and post-test design was employed. Participants were recruited using purposive sampling. The study included 11 respondents with type 2 diabetes mellitus who were over 40 years old, lived with family, had no significant sensory impairments, could communicate effectively, and were willing to participate. The intervention consisted of three DSME sessions delivered over 14 days at the Sekaran Health Centre. Results: Before the intervention (pre-test), 81.8% of participants demonstrated poor self-care behaviour, while 18.2% exhibited good self-care behaviour. Following the intervention (post-test), there was a significant improvement, with 72.7% demonstrating good self-care behaviour and 27.3% exhibiting poor self-care behaviour. Statistical analysis revealed a significant effect of the DSME and family support intervention on self-care behaviour ($p = 0.001$; $\alpha = 0.05$). Conclusion: DSME, combined with family support, is effective in improving self-care behaviour among individuals with type 2 diabetes mellitus, which can contribute to the prevention of diabetic foot ulcers. These findings underscore the importance of integrating DSME and family support into diabetes management programs

Keywords: Diabetes, DSME, Family Support

1. INTRODUCTION

The family, as the fundamental social unit, plays a vital role in health and well-being (1). However, the rapid advancement of technology and its influence on modern lifestyles, particularly unhealthy dietary choices and sedentary behaviours, has contributed to a rise in chronic diseases, including diabetes (2). Diabetes is a global health challenge with significant economic and social implications. If not effectively managed, it can lead to substantial healthcare costs and diminished quality of life (3).

Effective diabetes management requires a multifaceted approach that includes patient education, self-care, and family support. Non-compliance with treatment, poor risk factor control, limited knowledge, and lack of family involvement can hinder successful diabetes management and increase the risk of complications (4).

Type 2 Diabetes Mellitus (T2DM) is the most prevalent form of diabetes, typically affecting individuals over 40 years old, although it can also occur in younger adults (5). Approximately 90-95% of individuals with diabetes have T2DM. In T2DM, the pancreas produces insulin, but the body's cells are unable to utilize it effectively, leading to elevated blood sugar levels. Treatment for T2DM often involves oral medications to improve insulin

Received: November 6, 2024; Revised: December 28, 2024; Accepted: January 31, 2025; Published: February 07, 2025

sensitivity, lower blood sugar, and enhance glucose metabolism, rather than insulin injections (6).

The International Diabetes Federation (IDF) Atlas (2021) reported that over half a billion people worldwide live with diabetes (537 million), with projections indicating a substantial increase to 643 million by 2030 and 783 million by 2045. In Indonesia, the IDF estimates that 179,720,500 people have diabetes (7). Data from the Integrated Service Reporting System (SIRANDU) of the Semarang City Health Office indicate that the prevalence of T2DM in Semarang City in 2023 was 8,991 cases (8).

Family support is crucial for individuals with diabetes, providing a network of encouragement and assistance. Strong family support can alleviate anxiety, promote treatment adherence, and motivate individuals to actively manage their condition (9). This support can manifest in various forms, including practical assistance, emotional support, and social engagement, all of which contribute to the overall well-being of individuals facing the challenges of diabetes (10). Families with adequate knowledge about diabetes are more likely to provide effective support and contribute to successful diabetes management (11).

Diabetes Self-Management Education (DSME) empowers individuals with the knowledge and skills necessary for effective self-care. Recognizing the central role of the family in chronic disease management, DSME programs often adopt a family-centered approach. These programs provide education and training to family members involved in the care of individuals with diabetes, equipping them to provide informed support and contribute to optimal diabetes management (4, 3).

DSME programs play a crucial role in equipping individuals with diabetes and their families with the knowledge and skills necessary for effective self-management. These programs provide comprehensive information about diabetes care, including strategies to prevent complications and enhance quality of life. They help patients and families understand the rationale for various interventions, such as regular blood glucose monitoring, insulin administration (if needed), dietary modifications, and lifestyle changes (5). DSME programs offer structured guidance on self-care practices, empowering individuals to adopt healthy behaviours and improve their overall management of diabetes.

Research by Yuliana and Junaidin (2021) demonstrated the effectiveness of family-based DSME in improving self-care behaviours and quality of life in individuals with diabetes. Their study showed significant improvements in self-care and quality of life scores following a two-week intervention that included family-based health education and the use of

a diabetes self-management education booklet. These findings highlight the positive impact of DSME and family involvement in diabetes management.

Inspired by the potential of DSME and family support, this study aims to investigate the effectiveness of these interventions in preventing diabetic foot ulcers, a serious complication of diabetes.

2. LITERATURE REVIEW

Family

The family, the basic unit of society, comprises individuals living together and connected by bonds of kinship, marriage, or adoption (12, 13). Families provide a foundation for shared experiences, emotional support, and individual development. They are dynamic systems characterized by ongoing interaction and mutual support among their members.

Family Support

Family support encompasses the attitudes, actions, and acceptance that family members offer one another, creating a sense of belonging and security (16). It serves as a buffer against stress and provides a source of strength and resilience. Fridman defines family support as encompassing informational, appraisal, instrumental, and emotional support. This support network ensures that individuals feel cared for and have access to assistance when needed.

Type 2 Diabetes Mellitus

Type 2 Diabetes Mellitus (T2DM) is characterized by insulin resistance, a condition in which the body's cells do not respond effectively to insulin, the hormone responsible for regulating blood sugar levels (19). This resistance can lead to hyperinsulinemia (elevated insulin levels) as the pancreas attempts to compensate. Over time, the pancreas may lose its ability to produce sufficient insulin, resulting in elevated blood sugar levels and the clinical manifestation of T2DM (19). Decroli notes that 90% of diabetes cases are T2DM, highlighting its prevalence as a global health concern.

Diabetic Foot Ulcer

Diabetic foot ulcers are non-traumatic wounds that develop on the feet of individuals with diabetes. These ulcers often result from a combination of factors, including peripheral neuropathy (nerve damage), peripheral arterial disease (reduced blood flow), and repetitive pressure or shear forces on the feet. The impaired healing associated with diabetes and the increased risk of infection make diabetic foot ulcers a serious complication.

Diabetes Self-Management Education (DSME)

DSME is an ongoing process that empowers individuals with diabetes to effectively manage their condition (20). It provides the knowledge, skills, and coping strategies necessary for self-care. DSME programs go beyond traditional counselling approaches by actively engaging patients and their families in collaborative learning and problem-solving.

3. METHODS

This study employed a quasi-experimental, one-group pre-test-post-test design. This design involves assessing the outcome variable (self-care behaviours) before and after the intervention (DSME and family support) in a single group, without a control group for comparison. Self-care behaviours were measured using the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. The DSME intervention was delivered through a combination of counselling and educational materials, including booklets, flipcharts, leaflets, and posters.

4. RESULTS

This study, conducted from October 28, 2023, to December 3, 2023, investigated the effectiveness of Diabetes Self-Management Education (DSME) and family support in preventing diabetic foot ulcers. A total of 11 participants who met the inclusion criteria were enrolled in the study. Table 1 presents the demographic characteristics of the participants, including gender, education level, occupation, age, and duration of diabetes.

Table 1: Characteristics of Respondents
Based on Gender, Education, Occupation, Age and Duration of DM (n = 11**)**

Respondent Characteristics	Frequency (f)	Percentage (%)
Gender		
Male	4	36.45%
Female	7	63.6%
Education		
No School	1	9.1%
Elementary	6	54.5%
Junior High	2	18.2%
Senior/Vocational High	2	18.2%
Bachelor	0	0
Occupation		
Not working	5	45.5%
Self-employed	5	45.5%
Retiree	1	9.1%
Age		
45-54	2	18.2%
55-64	7	63.6%

Respondent Characteristics	Frequency (f)	Percentage (%)
65-70	2	18.2%
Duration of DM		
0-2 year	2	18.2%
3-5 year	8	18.2%
6-8 year	1	18.2%

Table 1 presents the demographic characteristics of the participants. Most participants were female (n=6, 54.5%). The highest level of education reported was elementary school (n=6, 54.5%). Most participants were unemployed (n=5, 45.4%). The most common age range was 55-64 years (n=7, 63.6%), and the most frequent duration of diabetes was 3-5 years (n=8, 72.7%).

Table 2. Description of Self-Care Behaviour Before and After Intervention

Variable	Pre test		Post test	
	Frequency (f)	**Percentage (%)**	**Frequency (f)**	**Percentage (%)**
Bad self-care behavior	**9**	**81.8%**	**3**	**27.3%**
Good self-care behavior	**2**	**18.2%**	**8**	**72.7%**
Total	**11**	**100%**	**11**	**100%**

Table 2 presents the pre- and post-test scores for self-care behavior. As shown in the table, there was a significant improvement in self-care behavior following the DSME and family support intervention. The percentage of participants exhibiting poor self-care behavior decreased from 81.8% at pre-test to 27.3% at post-test. Conversely, the percentage of participants demonstrating good self-care behavior increased from 18.2% to 72.7% after the intervention. This finding indicates that the DSME program, combined with family support, was effective in promoting positive changes in self-care behaviors among individuals with type 2 diabetes.

The Effect of Diabetes Self-Management Education/Support (DSME/S) on Self-Care Behaviour

The results of statistical tests showed that there was an effect of diabetes self-management education/support (DSME/S) intervention on self-care behaviour ($p = 0.001$, $\alpha = 0.05$). This can be seen in table 3.

Characteristics	Before		After	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Autonomic Neuropathy				
Dry/scaly feet	9	81.8%	4	36.4%
Cracked heels	8	72.7%	3	27.3%
Calluses	3	27.3%	1	9.1%
Corns	7	63.6%	5	45.5%
Hyperpigmentation	3	27.3%	2	18.2%

Characteristics	Before		After	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Motor Neuropathy				
Plantar warts	0	0	1	9.1%
Hypotrophy	2	18.2 %	1	9.1 %
Hallux Valgus	3	27.3 %	2	18.2%
Nail Disorders				
In growing nail	6	54.5 %	3	27.3 %
Thickened toenails	3	27.3 %	1	9.1%
Nail discoloration	3	27.3 %	2	18.2%
Brittle toenails	6	36.4 %	2	18.2%
Nail atrophy	2	18.2 %	1	9.1%
Infection				
Interdigital maceration	4	36.4 %	2	18.2%
Nail infection	0	0	1	9.1%
	0	0	1	9.1 %
Total	9	100	6	63.6%

Table 3 presents data on the incidence of non-ulcerative diabetic foot problems before and after the DSME and family support intervention. Before the intervention, all 11 participants (100%) experienced a total of 59 foot problems. The most common issues were related to autonomic neuropathy, including dry/scaly skin, cracked heels, and corns. Following the intervention, the number of participants experiencing foot problems decreased to 6 (63.6%), with a total of 38 foot problems reported. While there was an overall reduction in foot problems, corns remained the most prevalent issue, affecting 5 participants (45.5%). These findings suggest that while the DSME and family support intervention may contribute to a reduction in certain foot problems, ongoing education and monitoring are essential to address persistent issues like corns, which can increase the risk of ulceration.

5. DISCUSSION

Respondent Characteristics

1. Respondent Characteristics Based on Gender, Education, Occupation, Age and Duration of Suffering

The majority of participants in this study were women (n=7, 63.6%). Gender can influence health behaviour and self-management abilities. The initial assessment (pre-test) revealed that most participants had poor self-care behaviours, aligning with Eskasenda's (2021) findings that men tend to exhibit better self-care management compared to women.

The highest level of education reported among participants was elementary school (n=6, 54.5%). Education level can also impact self-management abilities, and the

relatively low education level of some participants may have contributed to their challenges in maintaining optimal self-care routines.

Most participants were unemployed (n=5, 45.4%). The most common age range was 55-64 years (n=7, 63.6%), and the most frequent duration of diabetes was 3-5 years (n=8, 72.7%). Age and disease duration can influence an individual's capacity for self-management. Older adults with longer disease duration may have greater awareness of their condition and the importance of self-care due to increased interactions with healthcare providers and experiences with managing their condition.

DSME programs aim to support informed decision-making, self-care behaviours, problem-solving, and collaboration with healthcare teams to improve clinical outcomes, health status, and quality of life. In this study, repeated visits during the intervention period provided opportunities for emotional support to both participants and their families. This approach aligns with Haris et al. (2020), who found that home visits can enhance family knowledge and promote positive health behaviours.

DSME goes beyond traditional counselling methods by actively engaging patients and their families in the learning process. Individuals with chronic diseases benefit from strong support networks that foster acceptance, trust, and motivation. This study emphasized family support, including stress management and collaborative planning, recognizing its value in promoting sustainable self-care practices.

B. The Impact of DSME and Family Support on the Prevention of Diabetic Foot Ulcers

The DSME intervention demonstrated a significant impact on self-care behaviors and the prevention of diabetic foot ulcers. Pre-test assessments revealed that 9 participants (81.8%) had poor self-care behaviors, while only 2 (18.2%) had good self-care behaviors. Following the DSME and family support intervention, there was a marked improvement, with 8 participants (72.7%) demonstrating good self-care and only 3 (27.3%) exhibiting poor self-care.

Furthermore, the intervention showed a positive impact on the incidence of diabetic foot problems. Before the intervention, all 11 participants (100%) experienced a total of 59 non-ulcerative foot problems, primarily related to autonomic neuropathy (dry/scaly skin, cracked heels, and corns). After the intervention, 6 participants (63.6%) reported a total of 38 foot problems. While corns remained the most prevalent issue, the overall reduction in foot problems suggests that DSME and family support can contribute to better foot care practices and reduce the risk of complications.

6. CONCLUSION

1. The majority of participants were women (63.6%) with a low level of education (54.5% having completed only elementary school).
2. The DSME and family support intervention had a significant positive impact on self-care behaviours, with a notable shift from poor to good self-care practices among participants.

7. LIMITATION

This study has several limitations that should be acknowledged. First, the sample size was relatively small (n=11) for an experimental study. Although the researcher initially recruited 17 participants, four were excluded because they could not commit to the required 14-day intervention schedule. A larger sample size would have increased the statistical power of the study and enhanced the generalizability of the findings.

BIBLIOGRAPHY

Achjar N. (2013). Asuhan Keperawatan Keluarga. Edisi 2 Cet. Jakarta: CV Sagung Seto; 2013.

ADA (2020). Glycemic Targets: Standards of Medical Care in Diabetes. Diabetes Care 1 January 2020. Vol 43.

Ariana R. (2016). Gambaran Kualitas Hidup Pada PAsien Diabetes Mellitus Tipe 2 di RSUD Sanjiwani Gianyar. 1–23.

Asdar, F. (2022). Pemberdayaan Dukungan Psikologis Keluarga Dengan Kepatuhan Diet Pasien Diabetes Mellitus Di Desa Bontolempangan Kecamatan Bontoa. Idea Pengabdi Masy. 2(5), 224–30.

Badan Penelitian dan Pengembangan Kesehatan. (2019). Riset Kesehatan Dasar. In Jakarta: Kementrian Kesehatan RI

Badri, I.A., Lorenza, C., Asmika, I. (2022). Studi Kasus Pada Lansia Diabetes Melitus Dengan Ketidakstabilan Gula Darah. 4(3), 304–12 https://jurnal.ensiklopediaku.org/ojs-2.4.8-3/index.php/ensiklopedia/article/view/501

Cicilia L, Kaunang WPJ, Fima LFGL. (2018). Hubungan Aktivitas Fisik dengan Kejadian Diabetes Melitus pada Pasien Rawat Jalan di Rumah Sakit Umum Daerah Kota Bitung. J Kesma. 7(5), 1–6.

Dewi R, (2016). Hubungan Antara Pemantuan Glukosa Darah Mandiri Dengan Hipoglikemia Pada Diabetes Mellitus Tipe 2 Di. Ijonhs. 1(2), 92–6.

Dinas Kesehatan Kota Semarang. (2023). Non-insulin-dependent diabetes mellitus. http://119.2.50.170:9090/sirandu/#map

Dr. Made Ratna Saraswati S-K. (2021). Diabetes Melitus Adalah Masalah Kita. https://yankes.kemkes.go.id/view_artikel/1131/diabetes-melitus-adalah-masalah-kita

Efendi F, Makhfudli. (2019) Keperawatan Kesehatan Komunitas: Teori dan Praktik dalam Keperawatan. Edisi 1. Nursalam D, editor. Jakarta: Salemba Medika.

Efendi H, Larasati T. (2017). Dukungan Keluarga dalam Manajemen Penyakit Hipertensi. Ed 6, 34–40.

Faisal., Muzzakir., P.H WM. (2018). Faktor Yang Berhubungan Dengan Minat Home Care Pada Lansia Penderita Diabetes Melitus Di Puskesmas Sudiang Raya. J Ilmu Kesehatan. 12, 20–7.

Fitriani S. (2015). Promosi Kesehatan. Edisi 2. Jakarta: EGC.

Gambaran Dukungan Keluarga Pada Ulkus Diponegoro. (2023). Pasien Ulkus Diabetikum Di Rumat. 11(1), 9–20.

H. Zaidin Ali, SKM, MBA M. (2021). Pengantar Keperawatan Keluarga. EGC; Suryati I. Buku Keperawatan Latihan Efektif Untuk Pasien Diabetes Mellitus Berbasis Hasil Penelitian. Cetakan 1. Yogyakarta: Deepublish.

Handari SD, Rahmasari M, Adhela YD. (2023).Hubungan Diabetes Melitus, Kolesterol dengan Skor Kalsium pada Pasien Hipertensi dengan Status Gizi Obesitas. Amerta Nutr. 7(1), 7–13.

Husna A, Jafar N, Hidayanti H, Dachlan DM, Salam A. (2022). Hubungan Kepatuhan Minum Obat Dengan Gula Darah Pasien Dm Tipe Ii Di Puskesmas Tamalanrea Makassar. JGMI J Indones Community Nutr. 11(1), 20–6.

Istiyawanti, Udiyono H, A. Ginanjar P, Adi M. (2019). Gambaran Perilaku Self-Care Management Pada Penderita Diabetes Melitus Tipe 2. J Kesehat Masy. Vol 7.

Jannah, N., Uprianingsih, A. (2020). Optimalisasi Diabetes Self Management Education (Dsme) Dengan Dukungan Keluarga Terhadap Pencegahan Kaki Diabetes Di Kota Bima. J Ilm PANNMED (Pharmacist, Anal Nurse, Nutr Midwivery, Environ Dent. 15(3), 410–4.

Lindsay S Mayberry, Rothman, R.L., Osborn, C.Y. (n.d.). Family members' obstructive behaviors appear to be more harmful among adults with type 2 diabetes and limited health literacy. J Heal Commun.

Lutfiah AS. (2023). Jurnal Ilmiah Kesehatan Evaluasi metode Diabetes Self Management Education (DSME) pada pendetira Diabetes Melitus Tipe 2. 2(1), 1–10

Mahfud MU. (2012) Hubungan Perawatan Kaki Pasien Diabetes Melitus Tipe 2 Dengan Kejadian Ulkus Diabetik Di RSUD Dr. Moewardi. Univ Muhammadiyah Surakarta. 5.

Maria H. Bakri, SKM. MK. (2020) Asuhan Keperawatan Keluarga. Yogyakarta: PT. Pustaka Baru.

Moshinsky M. (2020). Hubungan Efektivitas Self Care Dengan Kontrol Glukosa Darah Pada Pasien Diabetes Mellitus Tipe II. Nucl Phys. 13(1), 104–16.

Norma Lalla NS, Rumatiga J. (2022). Ketikdakstabilan Kadar Glukosa Darah Pada Pasien Diabetes Melitus Tipe II. J Ilm Kesehat Sandi Husada. 11, 473–9.

Nursalam. (2016). Metode Penelitian Ilmu Keperawatan. Edisi 4. Jakarta: Salemba Medika.

Price SW. (2013). Patofisiologi Konsep Klinis Proses-Proses Penyakit. Jakarta: EGC.

Proverawati A, Widianti. (2010). Senam Kesehatan Aplikasi Senam Untuk Kesehatan. Yogyakarta: Nuha Medika.

Rahayu E, Kamaluddin R, Sumarwati M. (2019). Pengaruh Program Diabetes Self Management Education Berbasis Keluarga Terhadap Kualitas Hidup Penderita Diabetes Melitus Tipe II di Wilayah Puskesmas II Baturraden. 9(3)

Sabil, F.A., Kadar, K.S., Sjattar, E.L. (2019). Faktor – Faktor Pendukung Self Care Management Diabetes Mellitus TipE 2: A Literature Review. Jurrnal Keperawatan. Vol 10.

Santoso, P., Susilowati, E. (2018). Pengaruh Pendampingan Diet Terhadap Kepatuhan Diet Dan Kadar Gula Darah Pada Penderita Diabetes Mellitus Di Wilayah Puskesmas Balowerti Kota Kediri. J Ilmu Kesehat. 6(2), 182.

Siregar, D., et al (2020). Keperawatan Keluarga. edisi 1. 1 E, editor. medan: Yayayan Kita Menulis.

Suminar E, Sari LT. (2023). Pengaruh Senam Otak Terhadap Perubahan Daya Ingat (Fungsi Kognitif) Pada Lansia. 13(2).

Susanti Niman, M.kep., Ns. SK. (2017). Promosi dan Pendidikan Kesehatan. Cetakan 1. Ismail T, editor. Jakarta: CV Trans Info Media.

Uelmen S. (2022). National Standards or Diabetes Self-Management Education and Support. Vol 45.

Vena R, Yuantari CM. (2022). Kajian Literatur: Hubungan Antara Pola Makan Dengan Kejadian Diabetes Melitus. JKM J Kesehat Masy. 9(2), 255–66.

Yuliana, S., Junaidin. (2021). Efektifitas Family Based Diabetes Self-Management Education terhadap Self-Care dan Kualitas Hidup Pasien Diabetes Mellitus. J Keperawatan Jiwa. 9(4), 879–86.

Yusra A, Syahabuddiin, Marlina. (2021). Edukasi Perawatan Kaki Pada Penderita Diabetes Mellitus Di Wilayah Kerjapuskesmas Syamtalira Aron. J Kesehat Luwu Raya. 7(2), 186–90.