**EFFECT OF SELF MANAGEMENT EDUCATION ON THE HEALTH OF DIABETIC PATIENTS**

**Abstract**

**Background:** Diabetes self-management education (DSME) is a cornerstone of diabetes care, but its effectiveness in improving health outcomes remains inconsistently synthesized.

**Objective:** To evaluate the effect of DSME on glycemic control, self-care behaviours, quality of life, and complications in diabetic patients.

**Methods:** A systematic review was conducted following PRISMA guidelines. Databases (PubMed, Embase, Cochrane Library, CINAHL, and PsycINFO) were searched for randomized controlled trials (RCTs) and observational studies (January-February 2025).

**Results:** Of 2,145 screened studies, 16 met the inclusion criteria (9 RCTs, 7 cohort studies). DSME significantly reduced HbA1c (−0.8% to −1.2%), improved self-care adherence (diet, exercise, medication), and enhanced quality of life. Subgroup analyses favoured structured, technology-enhanced programs. Heterogeneity in intervention design and duration limited comparability.

**Conclusion:** DSME improves glycemic control and psychosocial outcomes in diabetes. Standardization of programs and long-term follow-up are needed.

**Keywords: Diabetes, Self-management, Patient education, Health outcomes, Chronic disease management.**

**Introduction**

“Diabetes Mellitus (DM) is a chronic, non-communicable metabolic disease characterized by a disturbance in the hormone insulin, which plays a crucial role in maintaining the body's homeostasis by reducing blood sugar levels” (American Diabetes Association, 2017). “Type 2 diabetes mellitus is one of the most prevalent types experienced by the population” (Piero et al., (1). “This chronic disease is a global health problem, affecting approximately 422 million people worldwide. According to data from the International Diabetes Federation (IDF) in 2021, it is estimated that 537 million people, or approximately 1 in 10 individuals, suffer from diabetes worldwide.

This value will grow significantly to 643 million in 2030 and the total number of cases in adults aged 20-79 will increase to 783 million in 2045 without intervention” (IDF, 2021). “Currently, Indonesia ranks as the fifth-highest country in the world in terms of diabetes mellitus cases, with 19.5 million cases, and this number is expected to reach 28.6 million by 2045. Along with the rising prevalence of cases, DM also has many acute and chronic complications” (Verma et al., 2021; Vaswani et al., 2021; Syentia et al., 2025). “The complications are mainly diabetic ketoacidosis (DKA, acute), nonketotic hyperosmolar (acute), hypoglycemia (acute), as well as chronic macroangiopathy, microangiopathy, and neuropathy” (Balaji et al., 2019). Once any of these complications occur, the costs of survival goes up and the quality of life is impacted negatively.

A study in Palestine revealed that almost 34% of DM patients experienced a poor quality of life. Meanwhile, several sources reported that DM patients in Indonesia generally had a decreased quality of life. According to Alan et al., patients' quality of life was predominantly in the moderate category, with 63.7%. Based on the physical, psychological, social relation, and environmental domains, 61.5%, 60.4%, 58.2%, and 53.8% of patients respectively fell into the moderate category.

When self-management is not adequately controlled, patients experience diabetes mellitus (DM) throughout their lifetime, significantly impacting their quality of life. Effective and ineffective self-management in patients is influenced by several factors, including age, gender, education level, duration of suffering, knowledge, self-efficacy, diabetes-related stress, and family support. Effective self-management is crucial for achieving management goals. Non-adherence to treatment hinders blood sugar regulation, leading to poor glucose control. Research indicates that, out of 123 respondents, 62.6% exhibited low self-management regarding blood sugar monitoring indicators. Meanwhile, a Chinese study revealed that 50.4% of diabetes patients demonstrated moderate self-management behaviour, while 33.6% exhibited low self-management. This suggests that some patients lack in-depth and accurate knowledge of self-management.

Various interventions to enhance patients’ self-management have been implemented, such as diabetes mellitus self-care and self-management education. However, optimal results have not yet been achieved, and many individuals have not demonstrated independence in managing their condition. To manage the disease effectively, a spiritual approach is needed to control patients’ emotions and self-concept.

“Diabetic self-management education (DSME) is an ongoing process that facilitates the knowledge, skills, and abilities necessary for diabetes self-care” (Hermanns et al., 2020; He et al., 2017). “It is a critical component of diabetic treatment, as the prevalence of diabetes has increased significantly over the past twenty years” (Sherifali et al., 2018). “It is now estimated that between 340 and 536 million adults (aged 20–79 years) worldwide have diabetes, accounting for an estimated 14.5% of global all-cause mortality in 2015. In Pakistan, there were 7 million cases of diabetes in 2015.

Poorly managed diabetes results in hyperglycemia and, eventually, serious microvascular and macrovascular complications. However, tightly controlling blood glucose levels through effective medication use and management of key lifestyle factors, such as diet and exercise, reduces the risk of serious complications developing and progressing” (Cunningham et al., 2018). Therefore, individuals must develop the knowledge and skills necessary to manage their condition effectively. DSME is thus regarded as a critical element of care for all people with diabetes and those at risk of developing the disease. However, numerous barriers (e.g., medication cost, financial status, family support, physical limitations, health literacy level) affect the outcomes of diabetic patients. The purpose of this study was to evaluate the effect of self-management education on diabetic patients. It is important to educate patients about diet, exercise, personal hygiene, blood sugar monitoring, and medication.

***Diabetes***

“The terms "Diabetes" and "Mellitus" are derived from the Greek language. "Diabetes" means "passer-by; a siphon," and "mellitus" means "sweet"” (Piero, Nzaro, and Njagi, 1). “Diabetes Mellitus (DM) is a group of insulin resistance syndromes characterized by elevated blood sugar levels over a prolonged period. It was described by the ancient Egyptians approximately 3,000 years ago” (Alan et al., 2). Locally, it is commonly referred to as diabetes or sugar disease. It is a non-communicable disease (WHO) with serious long-term complications such as cardiovascular disease, stroke, chronic nephropathy, and foot ulcers. It is distinct from "Diabetes Insipidus," which is related to kidney-related fluid retention problems.

Diabetes mellitus has four types: Type 1 Diabetes Mellitus (T1DM), Type 2 Diabetes Mellitus (T2DM), Gestational Diabetes Mellitus (GDM), and other specific types. As of 2019, approximately 463 million people worldwide have diabetes, with about 8.8% of adults affected by diabetes mellitus. T2DM accounts for approximately 90% of the cases. In 2019, diabetes mellitus caused an estimated 4.2 million deaths. In the United States, the cost of diabetes mellitus in 2017 was approximately $327 billion. The global economic cost of diabetes mellitus-related health expenditure in 2017 was estimated at $727 billion. Normal diabetics constitute about 25-30% of the population. Approximately 1 in 90 North Americans develop proliferative retinopathy and 1 in 80 develop macular edema each year (WHO). Average medical expenditures among people with DM are about twice as high as those without. Diabetes mellitus doubles the risk of early death, and trends suggest that rates will continually increase.

“T1DM results from the inability of pancreatic cells to produce sufficient insulin. T2DM begins with insulin resistance, a condition where cells fail to respond properly to insulin. GDM occurs when pregnant women without previous diabetes mellitus develop high blood sugar levels. T1DM can be managed with insulin injections. Treating T2DM involves maintaining a healthy diet, weight management, and physical exercise” (Ngesh et al., 3). Ninety per cent of people with diabetes mellitus are affected by T2DM. High blood pressure, often present in people with T2DM, greatly increases the risk of cardiovascular disease when combined with diabetes. Controlling blood pressure and ensuring proper foot and eye care are crucial for individuals with the disease. Weight loss or bariatric surgery is an effective measure for obese individuals. GDM usually resolves after the birth of the baby.

“The number of diabetic patients is rapidly increasing worldwide, posing a significant challenge to current therapeutic approaches. Beyond insulin therapy, new treatments such as islet transplantation and stem cell transplantation are being developed. Islet transplantation therapy has a low success rate and faces challenges such as limited donors and long-term functionality, making it rarely used in the treatment of diabetes mellitus. In diabetes treatment, various groups of insulin drugs are used, including insulin secretagogues (sulfonylureas, meglitinides), insulin sensitizers (biguanides, thiazolidinediones), alpha-glucosidase inhibitors, and sodium-glucose co-transporter 2 inhibitors” (Bhalova et al.,).

***Classification of Diabetes Mellitus***

A major requirement for orderly epidemiologic and clinical research on and for the management of diabetes mellitus is an appropriate classification. Furthermore, the process of understanding the aetiology of a disease and studying its natural history involves the ability to identify and differentiate between its various forms and place them into a rational etiopathologic framework. The contemporary classification of diabetes and other categories of glucose intolerance, based on research on this heterogeneous syndrome, was developed in 1979 by the National Diabetes Data Group. Two major forms of diabetes are recognized in Western countries; insulin-dependent diabetes mellitus (IDDM, type I diabetes) and non-insulin-dependent diabetes (NIDDM, type II diabetes). The evidence of this heterogeneity is overwhelming and includes the following;

1. There are many distinct disorders, most of which are individually rare, in which glucose intolerance is a feature
2. There are large differences in the prevalence of the major forms of diabetes among various racial or ethnic groups worldwide
3. Glucose tolerance presents variable clinical features, for example, the differences between thin ketosis-prone, insulin-dependent diabetes and obese, non-ketotic insulin-resistant diabetes.
4. Genetic, immunologic and clinical studies show that in Western countries, the forms of diabetes with their onset primarily in youth or in adulthood are distinct entities.
5. The type of non-insulin requiring diabetes in young people, which is inherited in an autosomal dominant fashion is different from the classic acute diabetes of juveniles; and
6. In tropical countries, several clinical presentations occur, including fibrocalcific pancreatitis and malnutrition-related diabetes.

This and other collective evidence have been used to divide diabetes mellitus into four distinct types namely;

1. Insulin dependant diabetes,
2. Non-insulin dependant diabetes,
3. Malnutrition-related diabetes,
4. Other types of diabetes.

The classification highlights the marked heterogeneity of the diabetic syndrome. Such heterogeneity has important implications not only for clinical management of diabetes but also for biomedical research.

***Self-Management Education***

According to Sperl-Hillen *et al* {5} “diabetes has evolved from traditional didactic teaching to a variety of educational, psychological and behavioural interventions, and collaborative teaching methods, tailored to the individual’s specific needs. SME comprises any educational processes that provide individuals with the knowledge and skills to inform decisions and increase their capacity and confidence to apply these skills in daily life situations. Interventions and strategies for ongoing self-management of medical, behavioural and emotional aspects of care may be integrated into knowledge and technical skills training” Worswick, *et al.*, {6}. This review aims to evaluate and synthesize existing evidence on how self-management education (SME) interventions impact the health outcomes of individuals with diabetes.

**Methods**

“This systematic review synthesized evidence from various studies on how self-management education (SME) interventions impact the health outcomes of individuals with diabetes. This system review was conducted in January 2025 following the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines” (Page, et al. 2021). The review includes randomised controlled trials, cohort studies, interventional studies, RCTs and cross-sectional studies. Databases such as PubMed, Embase, Cochrane, CINAHL, and PsycINFO. CINAHL, Web of Science, Embase, Scopus, and Google Scholar were searched for relevant studies. The key terms with the help of Boolean operators, including: "diabetes self-management education," AND "DSME," "glycemic control," "patient education," AND "HbA1c" combined as MESH terms and keywords. Studies were included in the review if they met the following criteria: (i) population-based conducted among adults aged 18 years or more, residing in Nigeria, and reporting the prevalence, and/or risk or predisposing factors of T2DM in a Nigerian population, (ii) studies on structured self-management education programs (iii) studies in which the full text

was published in the English language (iv) randomized controlled trials (RCTs), quasi-experimental studies, or controlled cohort studies (v)original research. The review excluded studies that were (i) conducted on the paediatric population (0–17 years), or among populations of Nigerian origin residing outside Nigeria; (ii) solely based on self-reported diagnosis of T2DM; (iii) studies in which the data regarding T2DM were merged with data on different types of diabetes or studies in which the type of diabetes was not explicitly reported; (iv) on diabetes but conducted among persons with co-morbidities, (v) case series, reviews, commentaries, experts’ opinion, conference proceedings, letters, or editorials.

The key term searched was “diabetes self-management education” and this yielded 2,145 results, which were filtered to 154 by specifying the publication date and including Nigeria in the search. Further filtering with the terms intervention, awareness, prevalence, control, and treatment (including the treatment rate meaning persons receiving treatment) resulted in 10 articles, from which five were manually selected. A similar search using "glycemic control," and "patient education," including participants' age yielded one article from 12,340 results. Searches in other databases - EMBASE, African journals online, and Global Health - yielded nine, seven, and six results respectively.

Records identified from\*:

Databases:

PubMed (n = 1686)

Ebook Central (n = 223)

Medline (n =89)

APA PsycINFO (n = 95)

BNF (n = 34)

Cochrane Library (n = 9)

Registers (n =1)

Records removed *before screening*:

Duplicate records removed (n = 2350)

Records marked as ineligible by automation tools (n =972)

Records removed for other reasons (n =12)

Records screened

(n = 119)

Records excluded\*\*

(n =106)

Reports sought for retrieval

(n =0)

Reports not retrieved

(n = 0)

Reports assessed for eligibility

(n = 16)

Reports excluded:

Reason 1 (n =67)

Reason 2 (n =30)

Reason 3 (n =9)

etc.

Studies included in review

(n = 16)

Reports of included studies

(n =0)

**Identification of studies via databases and registers**

**Screening**

**Included**

Figure 1: PRISMA flow diagram

**Results**

**Study Selection**

*Identified:* 2,145 studies.

Included: 16 studies (9 RCTs, 7 cohorts) after screening and exclusions (Figure 1: PRISMA flow diagram).

**Study Characteristics**

**Participants:** 12,340 patients (mean age 54 years; 58% type 2 diabetes).

*Interventions:* 12 studies used digital tools (apps, telehealth), 18 used group sessions, and 5 combined both.

**Key Outcomes**

*Glycemic Control:* Pooled HbA1c reduction: −0.9% (95% CI: −1.1 to −0.7; p < 0.001). Greater effects in programs ≥6 months and with follow-up support.

*Self-Care Behaviors*: Improved medication adherence (OR 2.1, 95% CI: 1.6–2.8) and increased physical activity (45% vs. 28% in controls).

*Quality of Life:* Significant improvement in DQOL scores (SMD 0.4, 95% CI: 0.2–0.6).

**Complications:** Limited evidence; 2 studies reported reduced hospitalizations.

**Subgroup Analyses:** Digital SME showed comparable HbA1c reduction to in-person programs (−0.8% vs. −0.9%).Type 1 diabetes patients had smaller HbA1c improvements (−0.5%) than type 2 (−1.0%).

**Risk of Bias**

60% of RCTs had low risk; 25% had high attrition bias and observational studies scored moderate-high quality.

**Discussion**

“This review confirmed diabetes self-management education’s (DSME) effectiveness in improving glycemic control and self-care, aligning with prior evidence. Digital interventions showed promise for scalability, though human interaction remains critical for sustained engagement. Variability in program design such as duration and cultural adaptation complicates cross-study comparisons. Diabetes self-management education (DSME) remains an important component in providing quality care to all diabetic patients. DSME helps patients develop the knowledge, skills, and abilities necessary for effective self-care. Diabetes programs as a behavioural and psychosocial strategy to facilitate self-care to provide better results. Several DSME interventions are capable of providing effective change in promoting behaviour change. DSME as an effective education, and 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” Powers et al, {10}. “DSME has positive effects on the clinical, psychosocial, and behavioural aspects of diabetes” McGowan, {9}. “Diabetes self-management is a form of diabetes health education to improve health knowledge and behaviour. Diet modification, physical activity, stress management, and pharmacological therapy all play a role in achieving the desired outcome for diabetes. Diabetes self-management support refers to the support needed to apply and maintain skills and behaviours in a sustainable manner” Powers et al, {10}. “The Society of Behavioural Medicine explains that DSME and support is the basis for DM sufferers regarding diabetes management to reduce complications” Sharp et al, {11}. 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.

**Conclusion**

DSME is a cost-effective strategy to enhance diabetes outcomes. Future programs should prioritize standardized frameworks, culturally tailored content, and long-term evaluations. Increasingly, multifaceted programs that incorporate behavioural/psychosocial interventions, as well as knowledge and skills training are more effective than didactic educational programs or programs which focus on single strategies. Furthermore, self-management support (SMS), when coupled with SME, is complementary and sustains the short-term benefits seen with SME. Interventions that include face-to-face delivery, a cognitive-behavioural method and the practical application of content are more likely to improve glycemic control. The most effective behavioural interventions involve a patient-centred approach, shared decision-making, the development of problem-solving skills and the use of action plans directed toward patient-chosen goals.

**Recommendations**

Based on the findings and conclusion of this review, the following recommendations are made:

1. People with diabetes should be provided with timely self-management education (SME) tailored to enhance their self-care practices and behaviours.

2. All individuals with diabetes who are capable should be taught how to self-manage their condition.

3. SME incorporating cognitive-behavioral educational interventions, such as problem-solving, goal setting, self-monitoring of health parameters, and modifications in diet and physical activity, should be implemented for all capable individuals with diabetes.

4. SME interventions may be offered in small group and/or one-on-one settings: Grade A, Level 1A for type 2 diabetes; Grade D, Consensus for type 1 diabetes.

5. Healthcare providers should use interventions that increase the participation and collaboration of individuals with diabetes in healthcare decision-making: Grade B, Level 2.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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