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Effect of a Diabetes Self-Management Program on Self-Efficacy, Glycosylated Haemoglobin, and Quality of Life among Patients with Type 2 Diabetes Mellitus: A Quantitative Quasi-Experimental Study.

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ABSTRACT

Background: Type 2 diabetes mellitus requires sustained self-management to maintain glycaemic control and prevent complications. Structured diabetes self-management education can improve patients' confidence, self-care behaviours, and quality of life.

Objectives: To evaluate the effect of a Diabetes Self-Management Program on self-efficacy and quality of life and examine the relationships between self-efficacy, glycosylated haemoglobin (HbA1c), and quality of life among patients with type 2 diabetes mellitus.

Methods: A quantitative quasi-experimental pilot study with a pre-test–post-test design was conducted among 60 patients with type 2 diabetes mellitus attending the Medicine Outpatient Department of Sri Guru Ram Das Hospital, Amritsar, Punjab. Participants were selected through purposive sampling and allocated to experimental (n = 30) and control (n = 30) groups. The experimental group received a structured Diabetes Self-Management Program comprising education, an information booklet, telephone follow-up, and motivational messages, while the control group received routine care. Self-efficacy and quality of life were assessed before and after the intervention. Descriptive statistics, paired t-tests, and Pearson correlation analysis were used.

Results: Mean self-efficacy scores increased from 73.26 ± 9.47 to 106.44 ± 13.22 ($p < 0.001$). Significant improvements occurred in physical ($p = 0.003$), psychological, social, environmental, and overall quality-of-life scores (all $p < 0.001$). Self-efficacy was negatively correlated with HbA1c at baseline ($r = −0.420$, $p = 0.021$) and positively correlated with quality of life at post-test ($r = 0.481$, $p = 0.013$).

Conclusion: The program was associated with improved self-efficacy and quality of life. Its effect on HbA1c could not be determined because post-intervention values were unavailable.

Recommendations: Larger randomised controlled studies with longer follow-up and complete HbA1c assessments are recommended to establish intervention effectiveness and clinical outcomes.

Keywords: *Type 2 diabetes mellitus; Diabetes self-management programme; Self-efficacy; Glycosylated haemoglobin (HbA1c); Quality of life; Quasi-experimental study.*

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a major global public health concern characterised by chronic hyperglycaemia resulting from insulin resistance and progressive impairment of pancreatic β-cell function. It is associated with substantial morbidity, premature mortality, and increased healthcare expenditure. The International Diabetes Federation (IDF) has reported a continuing rise in diabetes prevalence worldwide, highlighting the need for effective preventive measures, early diagnosis, and long-term disease management [1]. Successful diabetes management requires not only pharmacological treatment but also sustained engagement in self-care activities, including dietary modification, regular physical activity, medication adherence, blood glucose monitoring, and prevention of diabetes-related complications.

Diabetes self-management education and support (DSMES) is an essential component of comprehensive diabetes care. It aims to equip individuals with the knowledge, practical skills, confidence, and motivation necessary to manage their condition effectively. Current diabetes care recommendations emphasise patient-centred, culturally appropriate educational interventions that encourage active participation in treatment decisions and promote sustainable behavioural changes [2,3]. Structured educational programmes incorporating individual counselling, written information, telephone follow-up, and motivational messages can provide continuing support for patients managing diabetes in everyday life.

Self-efficacy refers to an individual's confidence in their ability to perform specific behaviours required to achieve desired health outcomes. In patients with T2DM, higher self-efficacy is associated with greater confidence in medication adherence, dietary management, physical activity, glucose monitoring, and problem-solving. The Diabetes Management Self-Efficacy Scale (DMSES) is a validated instrument designed to assess patients' perceived ability to perform diabetes-related self-care activities [4]. Improving self-efficacy is therefore an important objective of diabetes self-management interventions.

Health-related quality of life is another important outcome in diabetes management, reflecting the physical, psychological, social, and environmental consequences of living with a chronic illness. Diabetes-related symptoms, treatment demands, and long-term complications can adversely affect patients' daily activities and overall well-being. The World Health Organization Quality of Life-BREF (WHOQOL-BREF) questionnaire provides a standardised assessment of quality of life across four major domains: physical health, psychological health, social relationships, and environment [5]. Evaluating these domains alongside self-efficacy provides a broader understanding of the potential benefits of diabetes self-management programmes.

Previous systematic reviews have demonstrated that structured diabetes self-management education improves diabetes-related knowledge, self-care practices, and glycaemic outcomes, although the magnitude of improvement varies according to programme duration, educational strategies, and participant characteristics [6–9]. Evidence from low- and middle-income countries further supports the effectiveness of diabetes self-management interventions in improving glycaemic control and psychosocial outcomes [10]. Nevertheless, evaluating structured programmes within specific healthcare settings remains important because educational needs, socioeconomic circumstances, cultural practices, and access to continuing support differ across patient populations.

In this context, a structured Diabetes Self-Management Program integrating face-to-face education, an information booklet, telephone follow-up, and motivational text messages was developed to strengthen diabetes management among patients attending a tertiary care outpatient department. The present quantitative quasi-experimental pilot study was undertaken to evaluate the effect of this programme on self-efficacy and quality of life among patients with T2DM and to examine the relationships between self-efficacy, glycosylated haemoglobin (HbA1c), and quality of life.

Materials and Methods:

Study Design and Setting

This quantitative, quasi-experimental pilot study employed a pre-test–post-test design involving experimental and control groups to evaluate the effectiveness of a structured Diabetes Self-Management Program on self-efficacy and quality of life among patients with type 2 diabetes mellitus (T2DM). The study was conducted in the Medicine Outpatient Department of Sri Guru Ram Das Hospital, Amritsar, Punjab, India, a tertiary care teaching hospital providing comprehensive multidisciplinary healthcare services, including general medicine, surgery, orthopaedics, obstetrics and gynaecology, paediatrics, emergency care, laboratory investigations, and diagnostic imaging. The study was carried out over a two-month period, from April to May

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2026. A total of 60 patients with T2DM were recruited through purposive sampling and assigned to the experimental (n = 30) and control (n = 30) groups. The study period included participant recruitment, baseline assessment, implementation of the structured intervention, follow-up, and post-test evaluation.

Study Population

The study population comprised adult patients aged 18 years and above, of either sex, diagnosed with type 2 diabetes mellitus (T2DM) and attending the Medicine Outpatient Department of Sri Guru Ram Das Hospital, Amritsar, Punjab, India. Patients receiving outpatient consultation and follow-up care for T2DM were considered for participation. A total of 60 eligible patients who provided written informed consent were recruited through purposive sampling and assigned to experimental (n = 30) and control (n = 30) groups. Participants were recruited on different outpatient days to minimise interaction and potential contamination between the groups.

Participants

The study included 60 adult patients diagnosed with T2DM, comprising 30 participants in the experimental group and 30 in the control group.

Eligible Criteria:

Inclusion criteria: Patients aged 18 years or older, of either sex, with an established diagnosis of T2DM, attending the Medicine Outpatient Department during the study period, meeting the predefined eligibility requirements, and providing written informed consent were included.

Exclusion criteria: These must be added according to the approved study protocol. Patients should not be retrospectively described as excluded for specific clinical conditions unless those exclusions were actually applied during recruitment.

Sample Size Determination

A total of 60 patients with T2DM were included in this pilot quasi-experimental study, with 30 participants allocated to each group.

Sample Size Calculation Formula

For comparison of two independent group means, the required sample size per group can be estimated using the following formula:

$$n = \frac{2(Z_{1-\alpha/2} + Z_{1-\beta})^2 \sigma^2}{\Delta^2}$$

Where:

n = Required sample size per group

$\mathbf{Z_{1-\alpha/2}}$ = Standard normal value corresponding to the significance level

$\mathbf{Z_{1-\beta}}$ = Standard normal value corresponding to statistical power

σ = Anticipated standard deviation of the outcome

Δ = Expected difference in mean change between the groups

Clinical Management

All participants continued to receive routine clinical management for type 2 diabetes mellitus (T2DM) through the Medicine Outpatient Department of Sri Guru Ram Das Hospital, Amritsar, Punjab, India. Clinical care included ongoing medical consultations and prescribed antidiabetic treatment. In addition to routine care, participants in the experimental group received a structured Diabetes Self-Management Program focusing on dietary practices, physical activity, medication adherence, blood glucose monitoring, lifestyle modification, recognition of warning symptoms, and prevention of diabetes-related complications. The programme incorporated a face-to-face educational session, an information booklet, telephone follow-up, and motivational text messages to reinforce self-management behaviours. Participants in the control group continued receiving routine medical care and were provided with the information booklet following completion of the post-test assessment.

Outcome Measures

The study outcomes were classified into primary and secondary outcomes based on the research objectives.

primary outcomes were changes in diabetes management self-efficacy and quality of life following implementation of the structured Diabetes Self-Management Program. Self-efficacy was assessed using the Diabetes Management Self-Efficacy Scale (DMSES), while quality of life was evaluated using the 26-item World Health Organization Quality of Life-BREF (WHOQOL-BREF) questionnaire, covering physical health, psychological health, social relationships, and environmental domains. Both outcomes were assessed at baseline and post-intervention to determine changes in scores.

secondary outcomes included the correlation between self-efficacy and glycosylated haemoglobin (HbA1c), the relationship between self-efficacy and quality of life, and associations of selected anthropometric and clinical variables with self-efficacy, HbA1c, and quality of life. Baseline HbA1c levels were recorded to assess glycaemic status.

Bias

Potential sources of bias in this quantitative quasi-experimental pilot study included selection bias, allocation bias, information bias, performance bias, and confounding. The use of purposive sampling and nonrandomised group allocation introduced selection bias and increased the possibility of baseline differences between the experimental and control groups. Recruiting participants on different outpatient days helped minimise intervention contamination but did not eliminate allocation bias. Self-reported

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assessments of diabetes management self-efficacy and quality of life were susceptible to recall and social-desirability bias. Furthermore, the absence of documented blinding of participants and outcome assessors increased the risk of performance and detection bias. Potential confounding factors, including age, diabetes duration, comorbidities, medication adherence, and baseline glycaemic status, were not comprehensively adjusted for in the reported analyses. These limitations should be considered when interpreting the observed improvements in self-efficacy and quality of life.

Statistical Analysis

Data were analysed using descriptive and inferential statistical methods. Sociodemographic and clinical characteristics were summarised using frequencies and percentages for categorical variables, while continuous variables were expressed as means, standard deviations (SD), and medians, as appropriate. Pre-test and post-test diabetes management self-efficacy and quality-of-life scores were compared using paired t-tests to assess within-group changes following the intervention. Pearson's correlation coefficient (r) was used to examine relationships between self-efficacy, glycosylated haemoglobin (HbA1c), quality of life, and selected anthropometric and clinical variables. Statistical significance was established at a two-sided p-value of less than 0.05.

Ethical Considerations

The study was approved by Institutional Ethics Committee, Sri Guru Ram Das University of Health Sciences, Amritsar, Punjab, India. Written informed consent was obtained from all participants after explaining the study objectives, procedures, potential benefits, and voluntary nature of participation. Participants were assured of confidentiality, anonymity in reporting, and their right to withdraw from the study at any stage without affecting their routine medical care. All collected information was used exclusively for research purposes.

Results:

The mean diabetes management self-efficacy score increased from 73.26±9.47 at pre-test to 106.44±13.22 at post-test, with a mean increase of 33.19±7.74 (paired $t=89.16$, $p<0.001$). Significant improvements were observed in physical health (2.85±0.23 to 3.05±0.22, $p=0.003$), psychological health (2.74±0.21 to 3.51±0.22, $p<0.001$), social relationships (2.62±0.24 to 3.03±0.40, $p<0.001$), environment (2.79±0.36 to 3.33±0.19, $p<0.001$), and overall quality of life (2.67±0.61 to 3.53±0.57, $p<0.001$). Baseline mean HbA1c was 8.89±1.47% in the experimental group and 8.99±1.56% in the control group. Self-efficacy was negatively correlated with HbA1c at pre-test ($r=-0.420$, $p=0.021$) and post-test ($r=-0.431$, $p=0.018$). The correlation between self-efficacy and quality of life was positive and significant at post-test ($r=0.481$, $p=0.013$).

Table 1
Sociodemographic characteristics of study participants

Variable	Category	Intervention n (%)	Control n (%)
Age (years)	<30	0 (0.0)	0 (0.0)
Age (years)	30-39	8 (26.7)	7 (23.3)
Age (years)	40-49	10 (33.3)	9 (30.0)
Age (years)	50-59	5 (16.7)	6 (20.0)
Age (years)	60-69	6 (20.0)	7 (23.3)
Age (years)	>69	1 (3.3)	1 (3.3)
Gender	Male	14 (46.7)	14 (46.7)
Gender	Female	16 (53.3)	16 (53.3)
Religion	Sikh	27 (90.0)	27 (90.0)
Religion	Hindu	2 (6.7)	2 (6.7)
Religion	Christian	0 (0.0)	0 (0.0)
Religion	Other	1 (3.3)	1 (3.3)
Marital status	Married	28 (93.3)	27 (90.0)
Marital status	Unmarried	0 (0.0)	2 (6.7)
Marital status	Divorced/separated	2 (6.7)	0 (0.0)
Marital status	Widow/widower	0 (0.0)	1 (3.3)
Residence	Urban	3 (10.0)	4 (13.3)
Residence	Rural	27 (90.0)	26 (86.7)
Education	No formal education	7 (23.3)	7 (23.3)
Education	Primary	10 (33.3)	11 (36.6)

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Variable	Category	Intervention n (%)	Control n (%)
Education	Secondary/higher secondary	12 (40.0)	12 (40.0)
Education	Graduation	1 (3.3)	0 (0.0)
Education	Postgraduate	0 (0.0)	0 (0.0)
Monthly income (INR)	<10,001	9 (30.0)	9 (30.0)
Monthly income (INR)	10,001-20,000	13 (43.3)	12 (40.0)
Monthly income (INR)	20,001-30,000	8 (26.7)	9 (30.0)
Monthly income (INR)	>30,000	0 (0.0)	0 (0.0)
Occupation	Unemployed/homemaker	14 (46.7)	14 (46.7)
Occupation	Self-employed	9 (30.0)	10 (33.3)
Occupation	Labourer	2 (6.7)	2 (6.7)
Occupation	Government employee	0 (0.0)	0 (0.0)
Occupation	Private employee	5 (16.7)	4 (13.3)
Occupation	Retired	0 (0.0)	0 (0.0)

Note. N = 60 (30 participants per group). Values are n (%).

A family history of diabetes was reported by 40.0% of participants in the experimental group and 43.3% in the control group. Healthcare providers were the most frequently reported source of diabetes-related information. Most participants did not smoke or consume alcohol. Regular use of prescribed diabetes medication was reported by 76.7% of the experimental group and 80.0% of the control group. Most participants did not use alternative or other medicines for diabetes (table 2).

Table 2
Diabetes-related and lifestyle characteristics of study participants

Variable	Category	Intervention n (%)	Control n (%)
Family history of diabetes	Yes	12 (40.0)	13 (43.3)
	No	18 (60.0)	17 (56.7)
Source of diabetes information	Social media only	6 (20.0)	4 (13.3)
	Health-care provider only	17 (56.7)	18 (60.0)
	Social media + health-care provider	5 (16.7)	5 (16.7)
	Relatives/friends	2 (6.7)	2 (6.7)
	Other	0 (0.0)	1 (3.3)
Smoking	No smoking	28 (93.3)	28 (93.3)
	Current smoker	2 (6.7)	2 (6.7)
	Previous smoker	0 (0.0)	0 (0.0)
Alcohol consumption	No alcohol consumption	24 (80.0)	25 (83.3)
	Current alcohol consumption	4 (13.3)	4 (13.3)
	Past alcohol consumption	2 (6.7)	1 (3.3)
Diabetes medication	Regular	23 (76.7)	24 (80.0)
	Irregular	7 (23.3)	6 (20.0)
Alternative/other medicine	No	25 (83.3)	25 (83.3)
	Yes	5 (16.7)	5 (16.7)
Treatment type	Oral hypoglycemic agents + lifestyle modification	30 (100.0)	30 (100.0)

Note. N = 60 (30 participants per group). Values are n (%).

The anthropometric and clinical measurements are summarized in Table 3. The mean BMI was 26.02±5.12 kg/m² in the experimental group and 25.23±3.44 kg/m² in the control group. Mean random blood glucose was 219.24±75.95 mg/dL and 221.70±75.08 mg/dL, respectively. The mean baseline HbA1c was 8.89±1.47% in the experimental group and 8.99±1.56% in the control group. The median HbA1c was 9.00% and 9.10%, respectively

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Table 3
Anthropometric and diabetic parameters of study participants

Variable	Intervention M ± SD (median)	Control M ± SD (median)
Height (cm)	163.70±5.40 (163.0)	163.50±5.46 (162.5)
Weight (kg)	71.20±16.25 (67.0)	68.70±11.30 (67.0)
BMI (kg/m²)	26.02±5.12 (24.55)	25.23±3.44 (24.55)
Waist circumference (cm)	88.17±14.09 (87.0)	87.13±11.72 (87.0)
Hip circumference (cm)	97.93±12.11 (96.0)	97.30±10.06 (96.0)
Waist-hip ratio	0.894±0.050 (0.90)	0.891±0.047 (0.90)
Systolic BP (mmHg)	128.67±11.96 (130)	125.67±10.73 (125)
Diastolic BP (mmHg)	81.00±8.45	79.67±8.50
Random blood glucose (mg/dL)	219.24±75.95	221.70±75.08
Mean±SD	8.89±1.47	8.99±1.56

Note. N = 60 (30 participants per group). Values are means ± SD; medians appear in parentheses when reported.
Hypertension was the most frequent comorbidity in both groups. Neuropathy and nephropathy were the most frequently documented diabetes-related complications (table 4).

Table 4
Clinical characteristics of study participants

Clinical characteristic	Category	Intervention n (%)	Control n (%)
Diabetes complications	None	16 (53.3)	15 (50.0)
Diabetes complications	Neuropathy	8 (26.7)	7 (23.3)
Diabetes complications	Nephropathy	6 (20.0)	5 (16.7)
Diabetes complications	Other complication	0 (0.0)	3 (10.0)
Comorbidity	None	3 (10.0)	3 (10.0)
Comorbidity	Hypertension	21 (70.0)	18 (60.0)
Comorbidity	Hypothyroidism	4 (13.3)	4 (13.3)
Comorbidity	Other disease	1 (3.3)	1 (3.3)
Comorbidity	Hypertension + hypothyroidism	1 (3.3)	4 (13.3)

Note. N = 60 (30 participants per group). Values are n (%).
Baseline WHOQOL-BREF domain scores were similar descriptively between the two groups. In the intervention assessment, significant improvements were observed in all four WHOQOL-BREF domains and overall quality of life. The largest absolute increase was observed in the psychological domain, followed by the overall quality-of-life score (Table 5).

Table 5
Pre-test and post-test diabetes management self-efficacy scores

Variable	Pre-test M ± SD	Post-test M ± SD	Mean difference	Paired t	p
Diabetes management self-efficacy score	73.26±9.47	106.44±13.22	33.19±7.74	89.16	<0.001

Self-efficacy demonstrated a statistically significant moderate negative correlation with HbA1c at both pre-test and post-test. Self-efficacy demonstrated a moderate positive correlation with quality of life at pre-test that did not reach statistical significance, whereas the post-test correlation was statistically significant. Among selected clinical variables, weight and BMI were significantly positively correlated with self-efficacy. The remaining assessed clinical variables did not demonstrate statistically significant correlations with self-efficacy, HbA1c, or quality of life at the reported significance level (Table 6).

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Table 6
WHOQOL-BREF scores before and after the intervention

Domain	Intervention pre-test M ± SD	Control pre-test M ± SD	Intervention post-test M ± SD	Mean change	Paired t	p
Physical health	2.85±0.23	2.84±0.23	3.05±0.22	+0.19	6.71	0.003
Psychological health	2.74±0.21	2.73±0.22	3.51±0.22	+0.77	12.85	<0.001
Social relationships	2.62±0.24	2.62±0.24	3.03±0.40	+0.41	8.77	<0.001
Environment	2.79±0.36	2.80±0.35	3.33±0.19	+0.54	10.42	<0.001
Overall quality of life	2.67±0.61	2.75±0.47	3.53±0.57	+0.87	13.99	<0.001

Table 7
Correlations between self-efficacy, HbA1c, quality of life, and selected clinical variables

Variables	Pearson r	p
Pre-test self-efficacy vs HbA1c	-0.420	0.021
Post-test self-efficacy vs HbA1c	-0.431	0.018
Pre-test self-efficacy vs quality of life	0.365	0.072
Post-test self-efficacy vs quality of life	0.481	0.013
Height vs self-efficacy	0.267	0.154
Height vs HbA1c	0.003	0.987
Height vs quality of life	-0.102	0.591
Weight vs self-efficacy	0.404	0.027
Weight vs HbA1c	0.119	0.532
Weight vs quality of life	0.007	0.972
BMI vs self-efficacy	0.390	0.033
BMI vs HbA1c	0.161	0.395
BMI vs quality of life	0.023	0.905
Waist circumference vs self-efficacy	0.261	0.163
Waist circumference vs HbA1c	-0.100	0.598
Waist circumference vs quality of life	-0.048	0.802
Hip circumference vs self-efficacy	0.125	0.510
Hip circumference vs HbA1c	-0.179	0.344
Hip circumference vs quality of life	-0.047	0.805
Waist-hip ratio vs self-efficacy	0.309	0.097
Waist-hip ratio vs HbA1c	0.110	0.562
Waist-hip ratio vs quality of life	-0.154	0.415
Systolic BP vs self-efficacy	0.088	0.642
Systolic BP vs HbA1c	0.172	0.363
Systolic BP vs quality of life	-0.211	0.263
Diastolic BP vs self-efficacy	-0.065	0.732
Diastolic BP vs HbA1c	0.078	0.681
Diastolic BP vs quality of life	-0.226	0.230

DISCUSSION

The present quantitative quasi-experimental pilot study evaluated the effectiveness of a structured Diabetes Self-Management Program on self-efficacy and quality of life among 60 patients with type 2 diabetes mellitus (T2DM) attending a tertiary care hospital in Amritsar, Punjab, India. The findings demonstrated statistically significant improvements in diabetes management self-efficacy and all

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assessed domains of quality of life following the intervention. Furthermore, self-efficacy showed a significant negative correlation with glycosylated haemoglobin (HbA1c) and a positive correlation with quality of life at the post-test assessment. These findings provide preliminary evidence supporting the potential benefits of structured diabetes self-management education in outpatient clinical settings.

The mean diabetes management self-efficacy score increased from 73.26 ± 9.47 at baseline to 106.44 ± 13.22 following the intervention, representing a mean improvement of 33.19 points ($p < 0.001$). This finding indicates a substantial increase in participants' confidence in performing diabetes-related self-care activities. Self-efficacy is an important behavioural determinant of chronic disease management, influencing patients' ability to follow dietary recommendations, maintain physical activity, adhere to prescribed medications, and monitor blood glucose levels. These findings are consistent with the Diabetes Management Self-Efficacy Scale developed by van der Bijl et al. [4] and established diabetes self-management education recommendations emphasising patient empowerment and sustained behavioural modification [3].

The improvement in self-efficacy could be associated with the multimodal nature of the intervention, which incorporated a structured 40-minute face-to-face educational session, an information booklet, telephone follow-up, and motivational text messages. The involvement of a family caregiver during the educational session also provided an opportunity to strengthen support for diabetes management within the home environment. Continuing reinforcement through telephone communication and motivational messages can support retention of educational information and encourage adherence to recommended self-care activities. These findings are consistent with the recommendations of Powers et al. [7], who emphasised the importance of continuing diabetes self-management education and support rather than relying exclusively on a single educational encounter.

Significant improvements were observed across all four WHOQOL-BREF domains. Mean physical health scores increased from 2.85 ± 0.23 to 3.05 ± 0.22 ($p = 0.003$), while psychological health scores increased from 2.74 ± 0.21 to 3.51 ± 0.22 ($p < 0.001$). Similarly, social relationship scores increased from 2.62 ± 0.24 to 3.03 ± 0.40, and environmental domain scores increased from 2.79 ± 0.36 to 3.33 ± 0.19 (both $p < 0.001$). Overall quality-of-life scores improved from 2.67 ± 0.61 to 3.53 ± 0.57 ($p < 0.001$). The greatest absolute improvement among the four domains was observed in psychological health, suggesting that structured educational support was associated with improved emotional well-being and confidence in managing diabetes-related challenges.

These findings are consistent with previous evidence demonstrating the beneficial effects of diabetes self-management education on patient-reported outcomes. Steinsbekk et al. [6], in a systematic review and meta-analysis, reported favourable outcomes following group-based diabetes self-management education compared with routine treatment. Cunningham et al. [9] also examined the effects of diabetes self-management education on HbA1c and quality of life, supporting the relevance of educational interventions in comprehensive diabetes care. Nevertheless, the present findings should be interpreted cautiously because the study primarily reported within-group changes without a corresponding statistical comparison of intervention effects between the experimental and control groups.

The relationship between diabetes management self-efficacy and HbA1c was another important finding. A statistically significant negative correlation was observed between pre-test self-efficacy and HbA1c ($r = -0.420$, $p = 0.021$), indicating that participants with greater confidence in diabetes self-management tended to have lower HbA1c levels. This relationship is clinically relevant because effective diabetes self-care behaviours contribute to maintaining glycaemic control. Chrvala et al. [8] reported that structured diabetes self-management education was associated with improvements in glycaemic outcomes among adults with T2DM. Similarly, Chowdhury et al. [10] identified beneficial effects of diabetes self-management interventions on glycaemic control and cardiometabolic outcomes in low- and middle-income countries.

Therefore, the timing and interpretation of this correlation require clarification. The present study cannot establish whether the intervention produced a reduction in HbA1c or improved glycaemic control. Consequently, the observed correlations should be interpreted as associations between self-efficacy and recorded glycaemic status rather than evidence of a direct intervention effect on HbA1c.

A positive correlation was observed between self-efficacy and quality of life at baseline ($r = 0.365$, $p = 0.072$), although this association was not statistically significant. At post-test, the correlation became statistically significant ($r = 0.481$, $p = 0.013$), suggesting that participants reporting greater confidence in diabetes management also experienced better perceived quality of life. This finding highlights the potential relationship between psychological confidence, self-care capability, and overall well-being among patients with chronic metabolic disorders. However, the observational nature of these correlations prevents causal interpretation.

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Regarding anthropometric and clinical characteristics, weight ($r = 0.404$, $p = 0.027$) and body mass index (BMI) ($r = 0.390$, $p = 0.033$) demonstrated statistically significant positive correlations with self-efficacy. Other variables, including height, waist circumference, hip circumference, waist–hip ratio, and blood pressure, did not demonstrate statistically significant correlations with the assessed outcomes. These findings should be interpreted cautiously because the study involved a relatively small sample and multiple exploratory correlation analyses without adjustment for potential confounding variables.

The clinical characteristics of the participants further emphasise the importance of structured self-management support. Hypertension was the most frequently reported comorbidity, affecting 70.0% of participants in the experimental group and 60.0% in the control group. Neuropathy and nephropathy were also commonly documented diabetes-related complications. These findings indicate that many participants were managing diabetes alongside additional health conditions, increasing the importance of continuous clinical monitoring, medication adherence, appropriate lifestyle modification, and patient education.

The findings of this pilot study have practical implications for diabetes care in tertiary healthcare settings. Integrating structured, nurse-led educational programmes with routine outpatient management could provide additional support for patients in developing confidence and maintaining recommended self-care behaviours. The inclusion of family caregivers, written educational materials, telephone follow-up, and motivational text messages offers a potentially feasible approach to supporting continuity of diabetes education beyond hospital consultations. However, larger randomised controlled studies with adequate sample sizes, standardised follow-up periods, appropriate between-group statistical comparisons, and complete pre- and post-intervention HbA1c measurements are necessary to establish the effectiveness, sustainability, and long-term clinical impact of structured diabetes self-management programmes.

Generalizability

The generalisability of the present study is limited by its single-centre design, small sample size of 60 participants, purposive sampling, and nonrandomised group allocation. The findings are primarily applicable to adults with type 2 diabetes mellitus receiving outpatient care in tertiary healthcare settings with similar demographic, clinical, and socioeconomic characteristics. The predominance of rural participants further limits the applicability of the findings to urban populations and other healthcare environments. Differences in healthcare accessibility, educational status, cultural practices, and diabetes management resources restrict broader generalisation. Nevertheless, the findings provide preliminary evidence supporting structured diabetes self-management education in comparable clinical settings. Larger, multicentre randomised controlled studies involving diverse patient populations are recommended to establish external validity and confirm the effectiveness of the intervention.

CONCLUSION

The present quantitative quasi-experimental pilot study demonstrated significant improvements in diabetes management self-efficacy and all four domains of quality of life following implementation of a structured Diabetes Self-Management Program among patients with type 2 diabetes mellitus. Self-efficacy increased significantly from 73.26 ± 9.47 to 106.44 ± 13.22 ($p < 0.001$), with corresponding improvements in physical, psychological, social, and environmental well-being. A significant positive correlation was observed between self-efficacy and quality of life at post-test ($r = 0.481$, $p = 0.013$), while an inverse association was identified between self-efficacy and HbA1c at baseline ($r = -0.420$, $p = 0.021$). However, the absence of post-intervention HbA1c measurements prevented evaluation of changes in glycaemic control. The findings provide preliminary support for structured diabetes self-management education, although larger randomised controlled studies are required to confirm its effectiveness and long-term clinical benefits.

Limitations

The present study had several limitations. First, the small sample size of 60 participants and single-centre design restricted the statistical power and generalisability of the findings. Second, purposive sampling and nonrandomised group allocation introduced potential selection bias and confounding. Third, the absence of documented blinding and reliance on self-reported measures of self-efficacy and quality of life increased the risk of response and measurement bias. Fourth, the lack of reported between-group comparisons limited the ability to attribute observed improvements directly to the intervention. Finally, the unavailability of post-intervention HbA1c measurements prevented assessment of changes in glycaemic control, while the incompletely documented follow-up duration limited evaluation of the long-term sustainability of intervention outcomes.

Recommendations

Based on the study findings, structured Diabetes Self-Management Programs should be incorporated into routine outpatient care to improve self-efficacy and quality of life among patients with type 2 diabetes mellitus. Healthcare professionals, particularly nurses, should provide individualised diabetes education focusing on dietary management, medication adherence, physical activity,

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blood glucose monitoring, and prevention of complications. Regular telephone follow-up, motivational text messages, and family caregiver involvement are recommended to reinforce self-care behaviours and encourage sustained patient participation. Periodic assessment of self-efficacy, quality of life, and HbA1c should be undertaken to monitor clinical and behavioural outcomes. Furthermore, larger multicentre randomised controlled studies with adequate sample sizes, longer follow-up periods, and complete pre- and post-intervention HbA1c measurements are recommended to establish the long-term effectiveness and generalisability of structured diabetes self-management interventions.

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List of Abbreviations

T2DM: Type 2 Diabetes Mellitus
DM: Diabetes Mellitus
DSM: Diabetes Self-Management
DSMES: Diabetes Self-Management Education and Support
DMSES: Diabetes Management Self-Efficacy Scale
HbA1c: Glycosylated Haemoglobin
WHO: World Health Organization
WHOQOL-BREF: World Health Organization Quality of Life-BREF
BMI: Body Mass Index
BP: Blood Pressure
SD: Standard Deviation
IDF: International Diabetes Federation
OPD: Outpatient Department
INR: Indian Rupee
T: t-Test Statistic
r: Pearson's Correlation Coefficient
p: Probability Value

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The study has not received any Funding.

Conflict Of Interest

Nill

Data Availability

Data is Available on Request.

Author Contributions

Ranganayaki Lingaiyan: Study conceptualisation, research design, development and implementation of the Diabetes Self-Management Program, participant recruitment, data collection, data analysis, interpretation of findings, and preparation of the original manuscript.
Manpreet Kaur: Research supervision, methodological guidance, study design review, interpretation of findings, critical manuscript revision, and intellectual contributions to the final manuscript.
Manish Chandey: Clinical guidance, review of diabetes-related clinical parameters, interpretation of clinical findings, critical manuscript revision, and scientific review of the manuscript.

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