

Impact of Nurse Education Program in View of Better Outcome on Glycemic Control and Quality of Life Among Diabetes Mellitus Patients Visiting to Primary Health Care Centers of Ahemadnagar District

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Abstract: *Diabetes mellitus is a chronic metabolic disorder that requires continuous self-management, regular monitoring and lifestyle modifications to prevent complications and improve overall well-being. Nurse-led education programs play a vital role in empowering patients with knowledge and skills needed for effective diabetes management. A quantitative interventional research design was adopted and baseline assessments were conducted before implementing a structured nurse education program. Post-intervention evaluations assessed changes in glycemic control and quality of life using standardized tools. The findings indicated significant improvements in patients' glycemic control, self-care practices, treatment adherence and overall quality of life following the educational intervention. The study concludes that a structured nurse education program is an effective and sustainable approach for improving diabetes outcomes and enhancing the quality of life of patients receiving primary healthcare services.*

Keywords: Diabetes Mellitus, Nurse Education Program, Glycemic Control, Quality of Life & Primary Health Care.

I. INTRODUCTION

Diabetes mellitus is a major chronic non-communicable disease that poses significant health, social and economic challenges worldwide. Rising prevalence of diabetes in India has increased need for effective interventions that promote optimal glycemic control and improve patients' quality of life. Successful diabetes management depends not only on pharmacological treatment but also on patient education, lifestyle modification, regular monitoring of blood glucose, and adherence to self-care practices. In this context, nurses play a crucial role in empowering patients through structured educational interventions that enhance disease knowledge, encourage healthy behaviors and improve treatment compliance. Nurse education programs have been recognized as effective strategies for strengthening self-management skills, preventing diabetes-related complications and improving health outcomes. Assessing both glycemic control and quality of life provides a comprehensive evaluation of effectiveness of such interventions.

II. LITERATURE REVIEWS

Bhawane et al. (2026) assess risk of developing diabetes mellitus among adults attending a Rural Health Training Centre in Saoner, Central India. They evaluate diabetes risk using Indian Diabetes Risk Score & determine its association with selected demographic, lifestyle & clinical risk factors. Indian Diabetes Risk Score is a simple, practical & cost-effective screening tool developed for Indian population.

Viswanathan Mohan & Milind Tiwaskar (2025) observed that prevalence of diabetes has risen steadily over recent decades, reflecting rapid demographic, socioeconomic & lifestyle changes. They emphasized that India has witnessed a continuous increase in number of individuals affected by diabetes making disease a major contributor to morbidity, mortality & healthcare expenditure.

Muralidharan et al. (2024) conducted a narrative review on current diabetes scenario. Review described diabetes as a rapidly increasing non-communicable disease & highlighted largest diabetes populations in world. More than 50% of individuals with diabetes have poor glycaemic control commonly reflected by elevated levels.

Kibret Sendekie et al. (2023) assess patients' quality of life using standardized assessment tools & to identify clinical & treatment-related factors influencing health-related quality of life. Evaluating quality of life is essential for understanding broader impact of diabetes beyond conventional clinical outcomes and for improving patient-centred care.

Kshirsagar & Ashturkar (2022) underscored those non-communicable diseases, notably diabetes, hypertension & obesity are progressively augmenting the disease burden as a result of a confluence of hereditary, environmental & behavioural risk factors. Data showed that lifestyle-related health problems are becoming more common. Furthermore, incidence of hypertension was 23.1% in women & 24.4% in men and a significant number of persons had a higher waist-to-hip ratio indicating a strong link between obesity & metabolic disorders. Lifestyle diseases are becoming more common in both men & women.

Zhen Ling Teo et al. (2021) performed a systematic review & meta-analysis to estimate global prevalence & future burden of diabetic retinopathy through 2045. Their findings indicate that among individuals with diabetes prevalence is 6.17% & clinically significant macular edema is 4.07%.

Ambady Ramachandra (2020) assess treatment patterns, achievement of glycaemic targets & challenges associated with diabetes management in routine clinical practice. Study included participants with both forms of diabetes who were receiving care from healthcare professionals across multiple clinical settings providing valuable insights into real-world diabetes management.

Rodgers's A. (2019) performed a multicentric cross-sectional study indicating that prevalence rates of hypertension, diabetes, obesity & hypercholesterolemia among tribal groups respectively. They encompassed 1,864 people from four principal tribes across geographically diverse locations, employing standardized field-based evaluation techniques.

Rathi N. (2017) performed a cross-sectional study to investigate factors associated with inadequate glycaemic control in diabetic patients visiting two diabetes clinics in Delhi. Study examined electronic medical records of 300 patients and determined that merely 26.7% attained adequate glycaemic control signifying that a significant fraction of patients exhibited poorly managed diabetes. Results showed that glycaemic control did not change much with age or gender.

III. METHODOLOGY

Research Design and Setting

These adopted a quantitative quasi-experimental one-group pre-test and post-test research design to determine impact of a nurse education program on glycemic control and quality of life among diabetes mellitus patients. It was conducted in selected Primary Health Care Centers of Ahmednagar District, Maharashtra. Design enabled comparison of participants' glycemic control and quality of life before and after the educational intervention thereby assessing effectiveness of the nurse-led program in improving diabetes management outcomes.

Population, Sample & Sampling Technique

This consisted of adult patients diagnosed with diabetes mellitus attending the selected Primary Health Care Centers. A total of 150 participants meeting the inclusion criteria were selected using a non-probability purposive sampling technique. Eligible patients who consented to participate were enrolled in study. Sampling method ensured the inclusion of individuals capable of benefiting from the educational intervention and provided sufficient data to evaluate its effectiveness on glycemic control and quality of life.

Data Collection and Intervention

Data were collected using a structured socio-demographic questionnaire, standardized quality of life assessment scale and clinical indicators of glycemic control. Baseline information was obtained before implementing the intervention. A structured Nurse Education Program was then delivered, covering diabetes knowledge, medication adherence, dietary management, physical activity, blood glucose monitoring, foot care and prevention of complications. Post-test assessments were conducted using the same tools to measure changes in glycemic control and quality of life following intervention.

Statistical Analysis

Collected data were organized, coded and analyzed using appropriate descriptive and inferential statistical methods. Frequency, percentage, mean and standard deviation were used to summarize variables. Paired *t*-test was applied to compare pre-test and post-test scores while Chi-square test assessed associations between selected variables. Karl Pearson's correlation coefficient was used to determine the relationship between glycemic control and quality of life. Statistical significance was established at $p < 0.05$.

IV. RESULT & DISCUSSION

Demographic Characteristics of Diabetes Mellitus Patients

These included 150 diabetes mellitus patients attending selected Primary Health Care Centers in Ahmednagar District. Participants represented diverse age groups, genders, educational backgrounds, occupations and duration of diabetes. Most respondents were middle-aged adults with varying levels of education and treatment adherence. Diverse demographic profile ensured adequate representation of target population and facilitated assessment of influence of socio-demographic characteristics on glycemic control and quality of life following nurse education program.

Table 1: Demographic Characteristics of Diabetes Mellitus Patients

Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	88	58.7
	Female	62	41.3
Age (years)	30–40	28	18.7
	41–50	42	28.0
	51–60	50	33.3
	>60	30	20.0
Educational Status	Primary	36	24.0
	Secondary	58	38.7
	Graduate & Above	56	37.3
Duration of Diabetes	<5 Years	48	32.0
	5–10 Years	67	44.7
	>10 Years	35	23.3

This presents demographic characteristics of 150 diabetes mellitus patients who participated. Findings revealed that majority of participants were male (58.7%) while 41.3% were female. Regarding age, largest proportion of respondents (33.3%) belonged to the 51–60 years age group, followed by 41–50 years (28.0%), above 60 years (20.0%) & 30–40 years (18.7%). In terms of educational status, 38.7% of participants had completed secondary education, 37.3% were graduates or above & 24.0% had primary education. With respect to the duration of diabetes, 44.7% had been living with diabetes for 5–10 years, 32.0% for less than five years & 23.3% for more than ten years.

Impact on Glycemic Control

This revealed a significant improvement in glycemic control following implementation of structured nurse education program. Comparison of pre-test and post-test clinical parameters demonstrated better blood glucose management, improved medication adherence, healthier dietary practices and increased physical activity among participants. The paired *t*-test indicated a statistically significant difference between pre-intervention and post-intervention scores, confirming effectiveness of educational program in promoting improved glycemic control among diabetes mellitus patients.

Table 2: Comparison of Pre-test & Post-test Glycemic Control Scores

Assessment	Mean	SD	Mean Difference	t-value	p-value
Pre-test	9.18	1.24	1.63	18.42	<0.001*
Post-test	7.55	0.98	-	-	-

*Significant at $p < 0.05$.

Structured nurse education program resulted in a statistically significant improvement in glycemic control. Mean glycemic score decreased from 9.18 ± 1.24 during pre-test to 7.55 ± 0.98 after intervention with a mean difference of 1.63 ($t = 18.42$, $p < 0.001$). Findings indicate that participants adopted healthier dietary practices, improved medication adherence, increased physical activity & regularly monitored their blood glucose levels. These behavioral modifications contributed to better glycemic control & reduced risk of diabetes-related complications.

Impact on Quality of Life

Post-intervention assessment showed a considerable improvement in quality of life of participants across physical, psychological, social and environmental domains. Patients reported enhanced confidence in diabetes self-management, reduced disease-related stress, improved daily functioning and greater satisfaction with their overall health. These findings indicate that nurse education program not only improved clinical outcomes but also positively influenced overall well-being of diabetes mellitus patients receiving care through Primary Health Care Centers.

Table 3: Comparison of Pre-test and Post-test Quality of Life Scores

Assessment	Mean	SD	Mean Difference	t-value	p-value
Pre-test	58.36	7.82	15.48	21.16	<0.001*
Post-test	73.84	6.95	-	-	-

*Significant at $p < 0.05$.

Quality of life of participants improved significantly following nurse education program. The mean quality of life score increased from 58.36 ± 7.82 before intervention to 73.84 ± 6.95 after intervention with a mean improvement of 15.48 points ($t = 21.16$, $p < 0.001$). Participants experienced better physical functioning, psychological well-being, social relationships & environmental health. Improved diabetes knowledge and self-care practices enhanced confidence, reduced disease-related stress & promoted greater independence in managing their condition.

Table 4: Pre-test & Post-test Frequency & Percentage of HbA1c (%) among diabetes mellitus patients.
n=150

HbA1c (%) Level	Pre-Test		Post-Test	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
< 7.0% (good control)	04	2.7%	101	67.3%
7.0–8.0% (moderate)	76	50.7%	49	32.7%
> 8.0% (poor)	70	46.7%	00	0.0%

This shows difference between HbA1c (%) levels of diabetic mellitus patients before & after test. Results show that just 2.7% of the people in pre-test had good glycemic control (HbA1c < 7.0%). Most of them (50.7%) had moderate control & large number of them (46.7%) had poor control. After nurse-led education program was put into place, HbA1c values went up a lot. In post-test, a substantial percentage of individuals (67.3%) attained effective glycemic control whereas 32.7% continued to exhibit moderate control. Remarkably, none of subjects (0.0%) fell into poor control category. This shows that glycemic control got a lot better after the intervention, which shows that the nurse-led education program worked to lower HbA1c levels in people with diabetes mellitus. These results clearly show that participants' glycemic status got a lot better after intervention. This shows that nurse-led education program works to help diabetes mellitus patients better control their blood sugar levels.

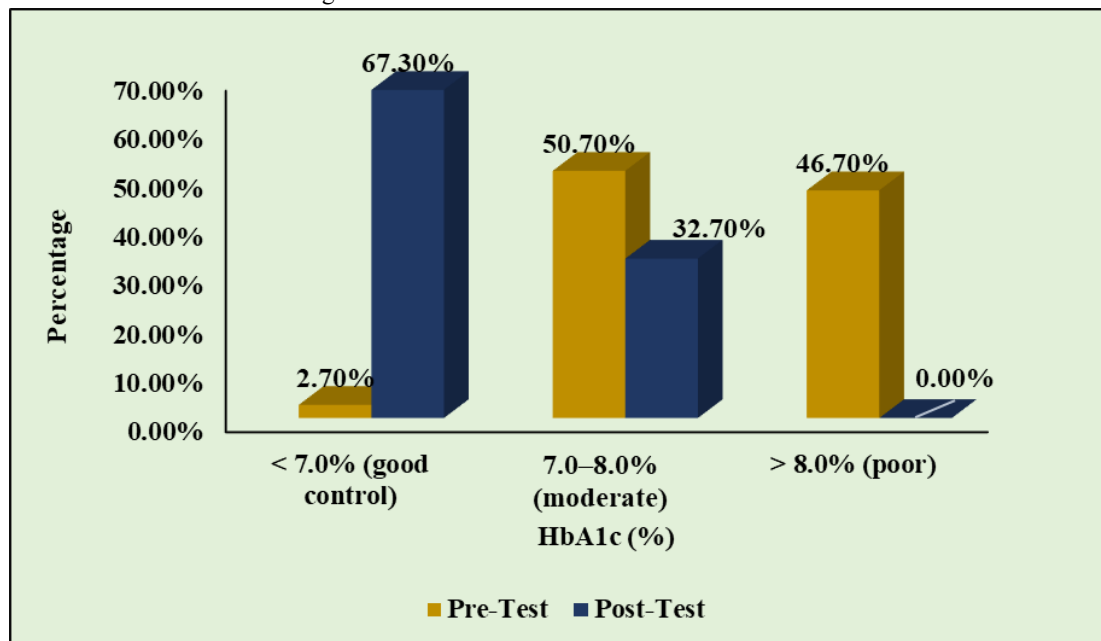


Figure 1: Percentage Distribution of Pre-test & Post-test of the HbA1c (%) among diabetes mellitus patients.

Table 5: Pre-test & Post-test Frequency & Percentage of Fasting Plasma Glucose (mg/dL) Level among diabetes mellitus patients
n=150

Fasting Plasma Glucose (mg/dL) Level	Pre-Test		Post-Test	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
80–130 mg/dL	04	2.7%	106	70.7%
131–180 mg/dL	77	51.3%	44	29.3%
>180 mg/dL	69	46.0%	00	0.0%

Pre-test findings revealed that majority of participants had unsatisfactory glycemic control. Only 4 participants (2.7%) achieved recommended fasting plasma glucose level of 80–130 mg/dL indicating that very few patients had adequate blood glucose control at baseline. A larger proportion, 77 participants (51.3%), recorded FPG levels between 131 & 180 mg/dL, suggesting moderately elevated fasting blood glucose values. Furthermore, 69 participants (46.0%) exhibited FPG levels exceeding 180 mg/dL, reflecting poor glycemic control & an increased risk of both acute and chronic diabetes-related complications. Number of participants achieving recommended fasting plasma glucose range of 80–130 mg/dL increased remarkably from 4 (2.7%) to 106 (70.7%). Proportion of participants with FPG levels between 131 and 180 mg/dL decreased from 77 (51.3%) in pre-test to 44 (29.3%) in the post-test, indicating that many individuals experienced a meaningful reduction in fasting blood glucose even if they had not yet reached optimal target range.

A particularly noteworthy finding is complete elimination of participants with fasting plasma glucose levels above 180 mg/dL. Before intervention, 69 participants (46.0%) were categorized as having poor glycemic control after nurse-led education program, none of participants (0.0%) remained in this category. This remarkable shift demonstrates effectiveness of educational program in reducing severe hyperglycemia & improving overall metabolic control among population.

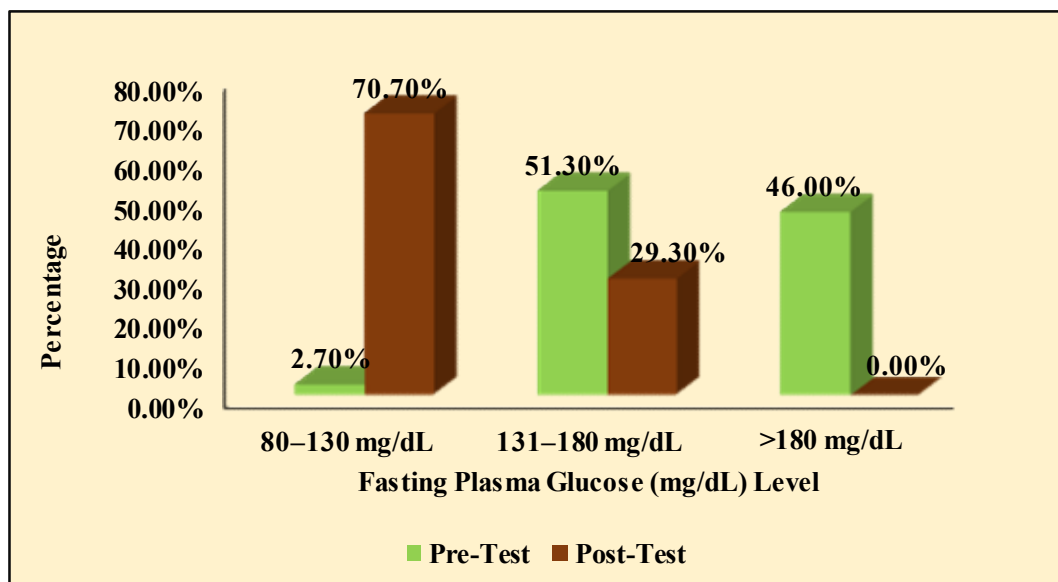


Figure 2: Percentage Distribution of Pre-test & Post-test of Fasting Plasma Glucose (mg/dL) Level among diabetes mellitus patients

V. CONCLUSION

Structured nurse education program had a significant positive impact on glycemic control and quality of life among diabetes mellitus patients attending Primary Health Care Centers in Ahmednagar District. Educational intervention enhanced patients' knowledge of diabetes, promoted adherence to medication, encouraged healthy dietary practices, regular physical activity, self-monitoring of blood glucose and appropriate foot care. These improvements resulted in better glycemic control & reduced risk of diabetes-related complications. Participants experienced notable improvements in their physical, psychological, social & environmental well-being reflecting an overall enhancement in quality of life. Findings highlight pivotal role of nurses as educators in empowering patients to adopt effective self-management behaviors & sustain long-term disease control. Integrating structured nurse education programs into routine primary healthcare services can strengthen diabetes management, improve patient outcomes, reduce healthcare burden & contribute to comprehensive, patient-centered care. Therefore, nurse-led educational interventions should be promoted as an essential component of diabetes management at primary healthcare level.

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