



“Effectiveness of Nurse Led Diabetes Management Programme on Selected Clinical & Biochemical Parameters among Patients with Type II Diabetes Mellitus”

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KEYWORDS

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ABSTRACT:

A Study to Assess the Effectiveness of a Nurse-Led Diabetes Management Program on clinical & Biochemical Parameters among Patients with Type II Diabetes Mellitus in Selected Villages of Mehsana District, Gujarat.

Background: Clinical and biochemical parameters are essential indicators for evaluating the severity, progression, and management outcomes of Type II Diabetes Mellitus (T2DM). Poor control of parameters such as fasting blood glucose, post-meal glucose, HbA1c, urine sugar, blood pressure, BMI, and waist circumference contributes to increased risk of microvascular and macrovascular complications. Nurse-Led Diabetes Management Programmes (NLDMP) have demonstrated significant promise in improving metabolic control through structured education, lifestyle modification, stress reduction practices, and continuous follow-up. This study aimed to determine the effectiveness of an NLDMP on clinical and biochemical parameters among 208 patients with T2DM.

Methods: A true experimental pre-test–post-test control group design was used. A total of 208 participants (104 experimental, 104 control) were selected using proportionate stratified random sampling from selected villages in Mehsana District. Clinical parameters assessed included BMI, waist circumference, blood pressure, and anthropometric measurements. Biochemical parameters included fasting blood glucose, post-meal blood glucose, 2-hour post-prandial glucose, urine sugar levels, and HbA1c.

The experimental group underwent a structured Nurse-Led Diabetes Management Programme, which included comprehensive diabetes education, personalized lifestyle modification counselling, diet planning, physical activity guidance, Rajyoga and mindfulness meditation sessions, self-care logbooks, and continuous telephonic follow-ups over a six-month period. The control group received routine standard care. Assessments were conducted at baseline, 3 months, and 6 months. Data were analyzed using descriptive and inferential statistics including paired and independent t-tests.

Results: The experimental group demonstrated highly significant improvements ($p < 0.001$) across multiple clinical and biochemical parameters, while the control group showed no significant changes. Detailed findings include: Clinical Parameters BMI: Notable reduction due to improved dietary adherence and regular physical activity. Waist Circumference: Significant decrease indicating reduced abdominal obesity and improved metabolic health. Blood Pressure: Reduction in systolic and diastolic BP attributed to stress reduction and lifestyle modification. General Clinical Condition: Improvement in symptom burden, reduction in fatigue, and enhanced physical functioning.

Biochemical Parameters Fasting Blood Glucose (FBG): Marked reduction at 3 and 6 months with statistically significant differences compared to control. **Post-Meal Glucose (PPBS):** Significant decline reflecting better carbohydrate regulation and medication adherence. **2-Hour Post-Prandial Glucose:** Significant improvement indicating enhanced glycaemic stability throughout the day. **Urine Sugar Levels:** Substantial decrease demonstrating improved renal glucose threshold and controlled hyperglycaemia. **HbA1c:** Clinically meaningful reduction over six months reflecting sustained glycaemic control.

The control group showed minimal or no change across all parameters, demonstrating that routine care alone



was insufficient to produce measurable improvements.

Conclusion: The Nurse-Led Diabetes Management Programme was highly effective in improving clinical and biochemical outcomes among patients with Type II Diabetes Mellitus. The structured, comprehensive, and patient-centered approach—combining education, lifestyle modification, meditation, and continuous follow-up—resulted in significant metabolic improvements. Incorporating NLDMP into routine clinical practice can reduce long-term complications, enhance glycaemic stability, and strengthen overall disease management.

Introduction

Type II Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from insulin resistance and relative insulin deficiency. Globally, diabetes has emerged as a major public health challenge due to its rapid rise, long-term nature, and growing burden of complications. The clinical and biochemical parameters of diabetes—such as fasting blood glucose (FBG), postprandial blood sugar (PPBS), glycosylated hemoglobin (HbA1c), blood pressure (BP), body mass index (BMI), waist circumference, and urine sugar levels—serve as essential markers to assess disease severity, metabolic control, and the risk of long-term complications.

Poorly controlled clinical and biochemical parameters are associated with microvascular complications such as retinopathy, nephropathy, neuropathy, and macrovascular complications including cardiovascular diseases, stroke, and peripheral vascular disorders. These complications significantly reduce functional ability, life expectancy, and quality of life. Therefore, the management of T2DM requires systematic monitoring, continuous patient education, and lifestyle modification.

Nurse-Led Diabetes Management Programmes (NLDMP) have gained global recognition as an effective approach to diabetes care. Nurses play a vital role in patient assessment, counselling, lifestyle modification, therapy adherence, and long-term follow-up. Evidence shows that structured nurse-led interventions significantly improve metabolic parameters, reduce complications, and promote self-management.

This study evaluates the effect of a structured NLDMP on clinical and biochemical parameters among 208 patients with T2DM. It aims to generate strong evidence for integrating nurse-led interventions into community-level diabetes care to improve overall metabolic control.

NEED OF THE STUDY (CLINICAL & BIOCHEMICAL PARAMETERS)

Despite widespread availability of treatment, a large proportion of patients with Type II Diabetes Mellitus remain poorly controlled due to lifestyle factors, inadequate knowledge, poor adherence, and lack of structured follow-up. This leads to persistently elevated clinical and biochemical parameters, resulting in complications that are costly, disabling, and often life-threatening. Need Justification: High prevalence of uncontrolled diabetes:

Many individuals in rural and semi-urban areas demonstrate poor glycemic control due to lack of education, inadequate follow-up, and improper dietary practices. Elevated risk of complications: Abnormal biochemical values such as high HbA1c, FBG, and PPBS directly correlate with increased risk of micro- and macrovascular complications. Lack of structured diabetes education: Traditional healthcare systems often do not provide continuous or personalized diabetes education, leading to poor self-management. Importance of nurse-led care: Nurses serve in frontline roles and are capable of continuous monitoring, patient motivation, lifestyle counselling, and follow-up. Evidence gap in rural India:

Limited literature exists on large-sample, community-based studies evaluating the effect of NLDMP on biochemical and clinical parameters. Thus, a structured, nurse-led intervention is urgently needed to improve metabolic outcomes and prevent complications among patients with T2DM.

RESEARCH METHODOLOGY

Research Approach

A quantitative approach was used to assess measurable changes in clinical and biochemical parameters following the intervention.



Research Design

A true experimental pre-test–post-test control group design was used to evaluate the effectiveness of the Nurse-Led Diabetes Management Programme.

Study Setting

The study was conducted in selected villages of Mehsana District, Gujarat (Bhandu, Valam, Sipor, and Chhabaliya).

Population & Sample

Adults aged ≥ 30 years diagnosed with Type II Diabetes Mellitus.

Sample Size

208 participants

- Experimental Group: 104
- Control Group: 104

Sampling Technique

Proportionate stratified random sampling.

Inclusion Criteria

- Diagnosed with T2DM for ≥ 6 months
- HbA1c $> 7\%$
- Able to participate in the intervention
- Understand Gujarati or Hindi

Exclusion Criteria

Clinical Parameters – Experimental Group (n = 104)

Parameter	Baseline	3 Months	6 Months	Result
BMI	Decreased significantly	↓	↓↓	Significant (p < 0.001)
Waist circumference	High	↓	↓↓	Significant (p < 0.001)
Systolic BP	Elevated	↓	↓↓	Significant
Diastolic BP	Elevated	↓	↓	Significant
Clinical symptoms	Moderate–severe	↓	↓↓	Improved

Interpretation: Intervention improved physical health and metabolic balance.

Biochemical Parameters – Experimental Group (n = 104)

- Pregnant women
- Individuals with severe psychiatric illness
- Complicated diabetes requiring hospitalization
- Those already enrolled in similar programs

INTERVENTION: Nurse-Led Diabetes Management Programme (NLDMP)

DURATION: 8 days of training + 6 months follow-up

MAJOR FINDINGS

The effectiveness of a **Nurse-led Diabetes Management Programme** was assessed on biochemical parameters among patients with Type II Diabetes. In the experimental group, fasting blood sugar improved markedly, with 62.7% of patients above 125 mg/dl at pretest reducing to 0% at 6 months, while 54.9% achieved optimal levels (80–100 mg/dl). Postprandial blood sugar also showed significant improvement, with 41.2% above 230 mg/dl at pretest reduced to 0% at 6 months, and 77.5% achieving levels between 170–200 mg/dl. Similarly, blood sugar measured 2–3 hours after meals shifted from 41.2% above 160 mg/dl at pretest to only 1% at 6 months, with 88.2% achieving optimal levels (120–140 mg/dl). HbA1c improved substantially, with 99% of patients above 6.4% at pretest reduced to 0% at 6 months, and all patients achieving values between 5.7–6.4%. Urine glucose also normalized, with 69.6% above 1000 mg/dl at pretest reduced to 0% at 6 months, and 76.5% showing negative results.



Parameter	Baseline	3 Months	6 Months	Result
Fasting Blood Glucose	High	↓	↓↓	Highly significant
Post-Meal Glucose	Very high	↓	↓↓	Significant
2-Hour PPBS	High	↓	↓↓	Highly significant
Urine sugar	Positive	Trace	Negative	Significant
HbA1c	>8%	↓	↓↓	Highly significant (p < 0.001)

Interpretation: Improved glycemetic control and reduced hyperglycemia.

Control Group (n = 104)

Minimal or no change across all clinical and biochemical parameters.

This study evaluated the effectiveness of a **Nurse-led Diabetes Management Programme** in patients with Type II Diabetes by comparing clinical outcomes between experimental and control groups. In the experimental group, health status improved dramatically, with all participants becoming healthy at 3 and 6 months posttest, while the control group showed only partial improvement (55% healthy). Weight stabilization was achieved in the experimental group, with minimal fluctuations (1% change), whereas the control group continued to show persistent changes (30–31%). Normal weight distribution increased steadily in the experimental group, while the control group displayed inconsistent trends. Blood pressure control was significantly better in the experimental group, with a marked reduction in cases above 130 mmHg, compared to modest improvements in the control group.

A paired t-test was conducted to evaluate the effectiveness of a **Nurse-led Diabetes Management Programme** on clinical parameters among patients with Type II Diabetes. Results demonstrated significant improvements across all measured outcomes. The average BMI decreased from 24.1 at pretest to 23.7 at both 3-month and 6-month posttests ($t = 5.2-5.3$, $p < 0.001$), indicating improved weight control. Systolic blood pressure reduced markedly from 137.6 mmHg at pretest to 126.0 mmHg at 3 months and 122.5 mmHg at 6 months ($t = 16.3-19.0$, $p < 0.001$). Similarly, diastolic blood pressure declined from 85.3 mmHg at pretest to 77.5 mmHg at 3 months and 75.8 mmHg at 6 months ($t = 10.1$, $p < 0.001$). These findings confirm that the Nurse-

led Diabetes Management Programme was **highly effective in improving BMI and reducing both systolic and diastolic blood pressure**, thereby demonstrating its clinical value in managing Type II Diabetes.

A paired t-test was conducted to assess the effectiveness of a **Nurse-led Diabetes Management Programme** on biochemical parameters among patients with Type II Diabetes. Findings revealed significant improvements across all measures. The average fasting blood sugar level decreased from 126.3 mg/dl at pretest to 108.9 mg/dl at 3 months and 103.3 mg/dl at 6 months ($t = 14.0-22.5$, $p < 0.001$). Postprandial blood sugar reduced from 222.2 mg/dl at pretest to 205.6 mg/dl at 3 months and 186.1 mg/dl at 6 months ($t = 9.6-21.7$, $p < 0.001$). Blood sugar levels measured 2–3 hours after meals declined from 154.7 mg/dl at pretest to 141.6 mg/dl at 3 months and 134.2 mg/dl at 6 months ($t = 8.7-17.3$, $p < 0.001$). HbA1c levels improved significantly, dropping from 7.0% at pretest to 6.5% at 3 months and 6.0% at 6 months ($t = 6.9-23.0$, $p < 0.001$).

DISCUSSION

The findings of the present study clearly demonstrate that the Nurse-Led Diabetes Management Programme was highly effective in producing significant improvements in both clinical and biochemical parameters among patients with Type II Diabetes Mellitus.

The improvements in BMI, waist circumference, and blood pressure indicate that sustained lifestyle modification and regular follow-up are important components in reducing the risk of cardiovascular complications. The significant reduction in fasting blood glucose, post-meal glucose, and HbA1c levels



demonstrates that the intervention successfully enhanced glycemic control. This aligns with international evidence suggesting that structured diabetes education combined with meditation and behavioural counselling reduces stress and improves metabolic outcomes.

The study also supports the role of nurses as primary facilitators of diabetes self-management. Continuous monitoring, personalized guidance, and patient-centered education helped participants adopt healthier behaviours, adhere to medication, and reduce glycemic fluctuations.

Overall, the results highlight the feasibility and effectiveness of implementing nurse-led interventions at the community level, particularly in rural and semi-urban settings where access to structured diabetes education is limited.

CONCLUSION

The Nurse-Led Diabetes Management Programme significantly improved clinical and biochemical parameters among 208 patients with Type II Diabetes Mellitus. The intervention effectively reduced BMI, waist circumference, blood pressure, fasting and post-meal glucose, urine sugar, and HbA1c values. These improvements indicate enhanced metabolic control and reduced risk of diabetes-related complications.

The findings strongly support the integration of nurse-led diabetes programs into routine primary care services, especially in underserved communities. Such programmes can contribute to better long-term outcomes, improved quality of life, and a reduction in the overall burden of diabetes.

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