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A STUDY TO EVALUATE THE EFFECTIVENESS OF AN EDUCATIONAL INTERVENTION ON KNOWLEDGE REGARDING LOWER EXTREMITY PERFUSION AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS AT SELECTED HOSPITALS IN CHENNAI

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ABSTRACT

Background: Reduced lower-extremity perfusion is a common, often silent complication of type 2 diabetes that increases risk of delayed healing, foot ulcers, infection, and amputation, and patient education may improve early recognition and self-care. **Methods**: A non-randomized controlled trial with pre-test, immediate post-test, and one-month follow-up (Assessments I–III) was conducted at a selected hospital in Chennai, including 160 purposively selected medically stable patients with type 2 diabetes and ABI <0.9 (80 experimental, 80 control); the experimental group received a structured LIFE lifestyle education program while the control group received usual care, and knowledge on lower-extremity perfusion (maximum score 30) was measured at each assessment. **Results**: Baseline knowledge was comparable between groups (Assessment I mean 20.37 vs 19.27, p=0.129); the study group showed progressive improvement across assessments (19.27 ±3.24 → 20.13 ±2.42 → 22.57 ±2.14) with a significant within-subjects change (F=27.841, p<0.001) and post-intervention superiority at Assessment III (mean difference 2.17, t=4.425, p<0.001), while the control group showed minor, non-significant fluctuations; categorical analysis mirrored these findings with a significant shift in knowledge distribution favoring the intervention at Assessment III ($\chi 2$=14.700, p<0.001). **Conclusion**: The structured, reinforced educational intervention significantly improved and sustained patients' knowledge about lower-extremity perfusion compared with usual care, supporting incorporation of targeted, repeated education into routine diabetes management to help prevent foot complications.

Keywords: Lower-extremity perfusion; Type 2 diabetes mellitus; Educational intervention; Knowledge; Diabetic foot prevention

INTRODUCTION

Type 2 diabetes mellitus is a growing global health burden and is strongly associated with vascular complications that affect the lower limbs. Reduced lower-extremity perfusion is an important early sign of peripheral arterial involvement and contributes to delayed healing, foot ulceration, infection, and amputation in patients with diabetes. Because these complications often progress silently, timely identification and patient awareness are essential for prevention and self-management (1,2).

Educational interventions have been shown to improve diabetes-related foot knowledge and preventive behaviors. A recent systematic review and meta-analysis of randomized controlled trials reported that educational programs improved foot-care knowledge and self-care behaviors, and were associated with reduced risks of foot ulcers and amputations. These findings suggest that structured teaching can play a meaningful role in preventing lower-limb complications by helping patients recognize warning signs, understand foot care practices, and seek early medical attention (1,3).

Despite this evidence, many patients with type 2 diabetes still have inadequate awareness of lower-extremity perfusion and related complications, particularly in routine clinical settings where time for individualized counseling may be limited. In addition, education may be more effective when reinforced over time rather than delivered as a single session, especially for complex chronic conditions requiring long-term behavior change. This makes the evaluation of targeted educational programs highly relevant in nursing and diabetes care (1)(4).

Therefore, the present study was undertaken to evaluate the effectiveness of an educational intervention on knowledge regarding lower-extremity perfusion among patients with type 2 diabetes mellitus at selected hospitals in Chennai. The findings may help strengthen preventive education strategies and support better clinical outcomes for patients at risk of diabetic foot complications.

NEED FOR THE STUDY

Type 2 diabetes mellitus is a major public health problem and is strongly associated with peripheral arterial disease affecting the lower limbs, leading to reduced lower-extremity perfusion, delayed wound healing, foot ulceration, infection, and risk of amputation in adults. These complications often progress silently, so patients may not recognize early warning signs such as claudication, colour change, reduced skin temperature, or non-healing minor trauma until advanced stages. Early identification and preventive care therefore depend heavily on patient awareness, regular foot surveillance, and timely health-seeking behavior, which are central components of nursing practice. However, evidence from clinical practice and research indicates that many patients with type 2 diabetes have inadequate knowledge about lower-extremity perfusion, its relationship to diabetic foot complications, and simple preventive measures such as daily foot inspection, appropriate footwear, and prompt reporting of symptoms. This knowledge gap persists despite routine diabetic counseling, possibly because education is often brief, general, and delivered only once during hospitalization or clinic visits. In this context, structured and reinforced educational interventions targeting lower-extremity perfusion may play a crucial role in strengthening patient understanding and long-term self-care. Recent evidence supports the effectiveness of such educational strategies. Drovandi et al. (2024) conducted a systematic review and meta-analysis and reported that educational interventions for diabetes-related foot disease improved patients' foot-care knowledge and self-care behaviors and were associated with reductions in foot ulcers and amputations (3,5). These findings highlight the need to test context-specific, nurse-led educational programs that focus on lower-extremity perfusion, particularly in hospitalized patients with type 2 diabetes. Therefore, the present study is needed to evaluate whether a structured educational intervention can significantly improve knowledge regarding lower-extremity perfusion among patients with type 2 diabetes mellitus in selected hospitals in Chennai, thereby supporting integration of targeted preventive education into routine nursing care. The need for this study arises from the fact that many patients still have inadequate knowledge about lower-extremity perfusion and its preventive care, while evidence from published studies shows that structured education can improve foot-care knowledge and self-care behaviors but may require repeated reinforcement for sustained impact (6,7). Therefore, this study is needed to evaluate whether an educational intervention can improve knowledge regarding lower-extremity perfusion among patients with type 2 diabetes mellitus, so that preventive teaching can be strengthened in routine clinical practice.

AIM OF THE STUDY

The aim of the study is to evaluate the effectiveness of an educational intervention on knowledge regarding lower-extremity perfusion among patients with type 2 diabetes mellitus admitted to selected hospitals in Chennai.

Research methodology

Research approach

A quantitative research approach was adopted for this study, as it is a powerful design for testing hypotheses of causal relationships among variables.

Research design

A non-randomised controlled Trial with pre-test and post-test control group was adopted for this study

Study Group	Pre-test	Intervention	Post-test I	Post-test II
Experimental Group	O_1	X_1	O_2	O_3
Control Group	O_1	—	O_2	O_3

O_1 – Pre-test assessment of knowledge and lower extremity perfusion level

O_2 – Post-test assessment of knowledge and lower extremity perfusion level at the time of discharge

O_3 – Post-test assessment of knowledge and lower extremity perfusion level after 1 month

X_1 – LIFE Program Intervention

Setting of the study

The study will be conducted at selected hospitals in Chennai with 220 in-patient beds.

Sample size

The sample consists of 160 selected patients diagnosed with Type 2 Diabetes Mellitus and impaired lower extremity perfusion 80 in the experimental group and 80 in the control group.

Sampling technique

A purposive sampling technique will be used to select samples for the present study.

Criteria for selection of samples

Inclusion criteria

- Patients who are with the age 45–59 years.
- Ankle Brachial Index (ABI) score less than 0.9.
- Both male and female patients.
- Patients receiving oral antidiabetic drugs or insulin therapy.
- Patients diagnosed with Type 2 Diabetes Mellitus with HbA1c value of ≥ 6.5
- Patients diagnosed with type 2 Diabetes Mellitus for more than 2 years .
- Patients who were medically stable and fit to perform mild therapeutic exercise

Exclusion criteria

- Patients who are critically ill.
- Patients with disoriented GCS <14/15.
- Patients not willing to participate.
- Patients with active diabetic foot ulcer, gangrene, or history of lower limb amputation
- Patients with a history of present problems such as deep vein thrombosis, varicose veins, or leg ulcers.

Variables

- Independent variable : Life Style program
- Dependent Variable : Knowledge on lower extremity perfusion, Lower extremity perfusion

Objectives

- To evaluate the effectiveness of a structured educational intervention on improving knowledge regarding lower-extremity perfusion among patients with type 2 diabetes mellitus admitted to selected hospitals in Chennai.
- To compare the pre-test and post-test knowledge scores on lower-extremity perfusion between experimental and control groups to determine the impact of the intervention on patients' understanding and preventive self-care.

Tool description

The Structured Knowledge Questionnaire was a self-administered/interviewer-administered instrument consisting of multiple-choice questions (MCQs) and/or closed-ended questions. The questionnaire was prepared in simple, clear language to ensure comprehensibility among participants with varying educational backgrounds. The tool was available in Tamil and English to facilitate accurate understanding and response.
Instruments used in this study will be:
Section A: Demographic Variables
Section B: Patient's Medical History and Clinical variables
Section C: Structured questionnaire on knowledge related to lower extremity Perfusion

Reliability

The reliability of the study instruments was established using appropriate psychometric tests for each tool. The structured knowledge questionnaire on lower-extremity perfusion was evaluated through test–retest reliability and yielded a correlation coefficient of 0.86, indicating good stability of responses over time. The lower-extremity perfusion assessment tool, used as an observational or clinical measure, demonstrated an inter-rater reliability coefficient of 0.82, confirming adequate agreement between different assessors. These

reliability coefficients indicate that all instruments were psychometrically sound and suitable for use in the present study.

RESULTS

Frequency and Percentage Distribution of Demographic Variables among Control and Study Group of Patients with Type 2 Diabetes Mellitus

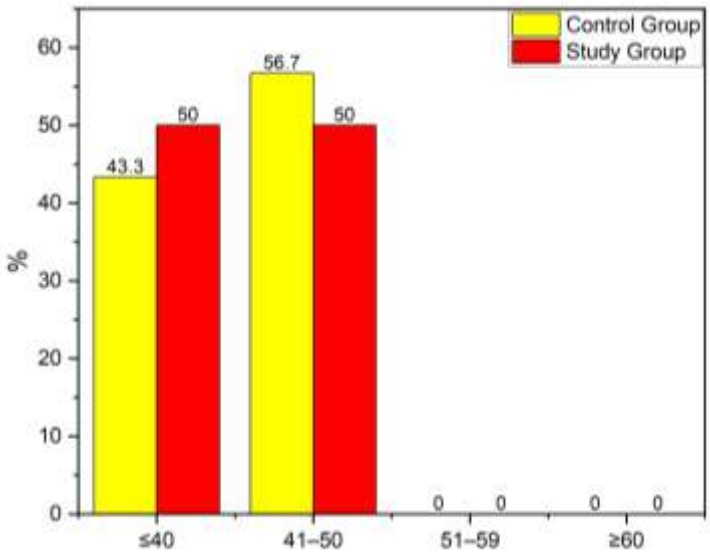

Fig. 1 Demographic variables of patients (age) with type-2 Diabetes Mellitus

The demographic profile (Fig. 1) indicates that both the control and study groups were largely comparable across most variables, indicating a generally homogeneous sample. In the control group, the majority were aged 41–50 years (56.7%), male (56.7%), married (43.3%), Christian (50.0%), had higher secondary education (33.3%), worked in blue-collar jobs (36.7%), performed sedentary work (43.3%), followed a non-vegetarian diet (66.7%), were non-smokers (66.7%), and were non-alcoholic (66.7%); similarly, in the study group, most participants were aged 40–50 years (50.0%), male (56.7%), married (50.0%), Christian (56.7%), had higher secondary education (36.7%), were self-employed (33.3%), engaged in moderate work (63.3%), followed a non-vegetarian diet (60.0%), were non-smokers (80.0%), and were non-alcoholic (60.0%). Statistically, no significant difference was observed between the groups for age ($\chi^2 = 0.268, p = 0.605$), gender ($\chi^2 = 0.000, p = 1.000$), religion ($\chi^2 = 1.002, p = 0.606$), educational status ($\chi^2 = 3.067, p = 0.547$), occupation ($\chi^2 = 4.445, p = 0.349$), nature of activity ($\chi^2 = 4.639, p = 0.098$), dietary pattern ($\chi^2 = 0.287, p = 0.592$), smoking ($\chi^2 = 1.364, p = 0.243$), or alcohol use ($\chi^2 = 0.287, p = 0.592$), whereas marital status showed a statistically significant difference between the groups ($\chi^2 = 10.375, p = 0.016$). Overall, the findings suggest that the two groups were broadly matched on demographic and lifestyle characteristics, with marital status being the only variable that differed significantly.

Frequency and Percentage Distribution of Clinical Variables among Control and Study Group of Patients with Type 2 Diabetes Mellitus

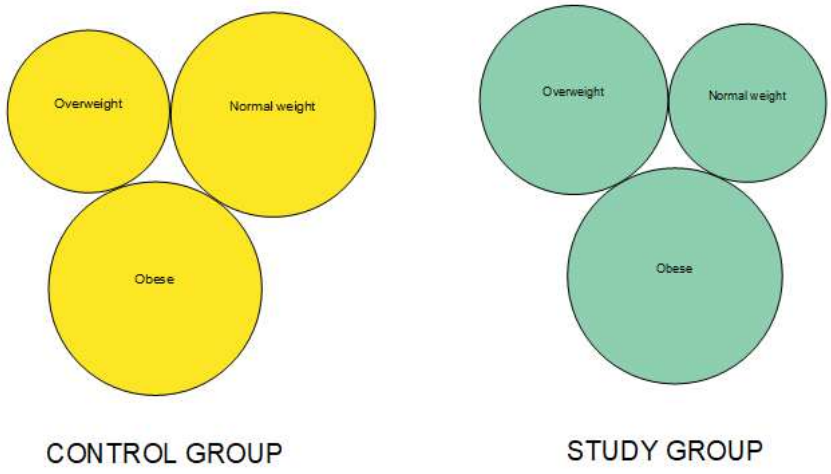

Fig. 2 Clinical variables (weight) of patients among control and study groups

The control and study groups were largely comparable in their clinical profile, with no statistically significant differences in most variables, indicating baseline homogeneity between the groups. In the control group, the majority were obese (40.0%) (Fig. 2), had HbA1c levels between 7.1 and 8.5 (46.7%) or above 8.5 (43.3%), reported a positive family history of diabetes mellitus (60.0%), had diabetes for more than 10 years (46.7%), and were receiving oral hypoglycemic agents (43.3%); in the study group, a similar pattern was observed, with obesity (43.3%), HbA1c levels between 7.1 and 8.5 (56.7%), positive family history of diabetes mellitus (70.0%), duration of diabetes of 2–5 years (33.3%) or 5–10 years (30.0%), and both oral hypoglycemic agents and insulin plus oral hypoglycemic agents accounting for 43.3% and 33.3%, respectively. Co-morbid conditions were also broadly similar across groups, with hypertension present in 56.7% of the control group and 46.7% of the study group, cardiac problems in 40.0% and 36.7%, renal problems in 16.7% and 10.0%, hypercholesterolemia in 60.0% and 36.7%, history of leg cramps in 16.7% and 16.7%, and family history of peripheral artery disease in 40.0% and 50.0%, respectively; however, none of these differences reached statistical significance, as the p values were greater than 0.05, including BMI ($p = 0.482$), HbA1c level ($p = 0.371$), family history of diabetes mellitus ($p = 0.417$), duration of diabetes mellitus ($p = 0.641$), diabetic treatment ($p = 0.589$), hypertension ($p = 0.438$), cardiac problems ($p = 0.791$), renal problems ($p = 0.448$), hypercholesterolemia ($p = 0.071$), history of leg cramps ($p = 1.000$), and family history of peripheral artery disease ($p = 0.436$). Overall, these findings indicate that the sample was clinically well matched, with only minor variations between the two groups and no meaningful baseline imbalance in the measured clinical variables.

Frequency and Percentage Distribution of Knowledge Levels among Control and Study Group of Patients with Type 2 Diabetes Mellitus

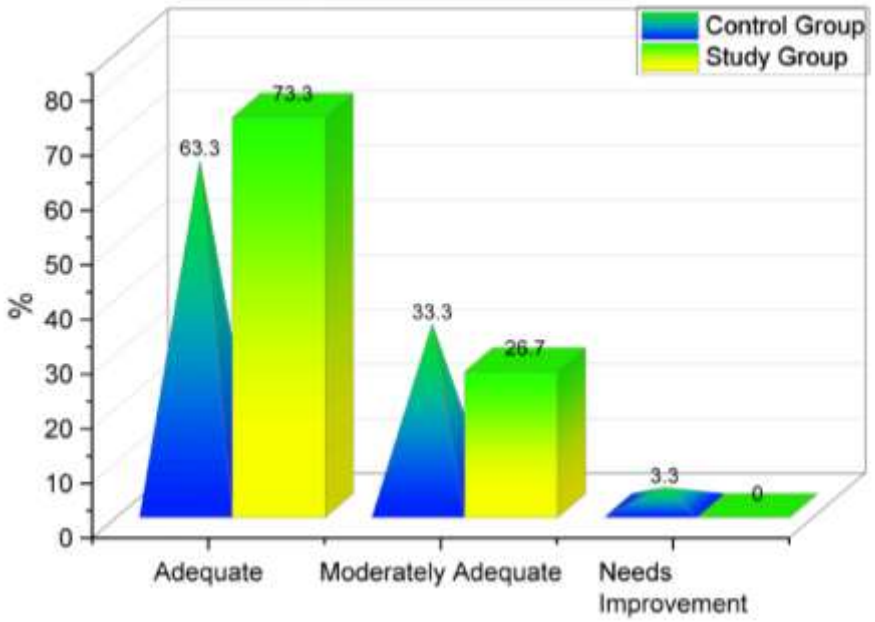

Fig. 3 Level of knowledge in Assessment I among control and study group

Table 1 Level of Knowledge on Lower Extremity Perfusion among Patients with Type 2 Diabetes Mellitus in Control and Study Groups

Knowledge Level	Control Group (n=30)	Study Group (n=30)	Chi-square Value	df	P value
	f (%)	f (%)			
Assessment I (Pre)					
Adequate	19 (63.3%)	22 (73.3%)	**1.442**	**2**	**0.486**
Moderately Adequate	10 (33.3%)	8 (26.7%)			
Needs Improvement	1 (3.3%)	0 (0.0%)			
Assessment II (P1)					
Adequate	7 (23.3%)	4 (13.3%)	**3.818**	**2**	**0.148**
Moderately Adequate	23 (76.7%)	23 (76.7%)			
Needs Improvement	0 (0.0%)	3 (10.0%)			
Assessment III (P2)			**14.700**	**1**	**0.000**
Adequate	17 (56.7%)	3 (10.0%)			
Moderately Adequate	13 (43.3%)	27 (90.0%)			
Needs Improvement	0 (0.0%)	0 (0.0%)			

Table I shows that in Assessment I, most participants in both groups had adequate knowledge on lower extremity perfusion, with 19 (63.3%) in the control group and 22 (73.3%) in the study group, while 10 (33.3%) and 8 (26.7%) had moderately adequate knowledge, and only 1 (3.3%) in the control group and none in the study group needed improvement; the difference was not statistically significant $\chi^2 = 1.442$, df = 2, p = 0.486. In Assessment II, adequate knowledge declined to 7 (23.3%) in the control group and 4 (13.3%) in the study group, whereas moderately adequate knowledge increased to 23 (76.7%) in both groups and 3 (10.0%) in the study group needed improvement, with no significant group difference $\chi^2 = 3.818$, df = 2, p = 0.148. By Assessment III, a clear shift was observed, with the control group showing 17 (56.7%) adequate and 13 (43.3%) moderately adequate knowledge, while the study group had only 3 (10.0%) adequate knowledge and 27 (90.0%) moderately adequate knowledge, and this difference was highly significant $\chi^2 = 14.700$, df = 1, p = 0.000. Overall, the pattern indicates that knowledge distribution changed across assessments, with the

final assessment showing a significant between-group difference in favor of the study group's moderately adequate knowledge level.

Comparison of Knowledge Scores between Assessments among Control and Study Group of Patients with Type 2 Diabetes Mellitus (RM ANOVA)

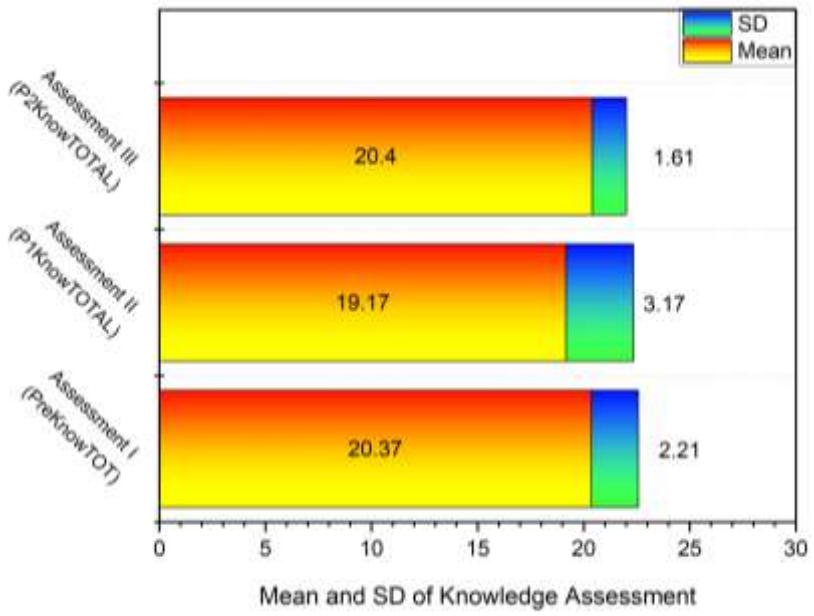

Fig. 4 Mean and SD of knowledge between assessments in control group

Table 2 Comparison of Mean and SD of Knowledge Between Assessments in Control Group of Patients with Type 2 Diabetes Mellitus

Assessment	Max Score	Mean ± SD	Within-Subjects F (p value)	Between-Subjects F (p value)
Assessment I (PreKnowTOT)	30	20.37 ± 2.21	F = 2.371, p = .102	F = 7136.976, p < .001
Assessment II (P1KnowTOTAL)		19.17 ± 3.17		
Assessment III (P2KnowTOTAL)		20.40 ± 1.61		

Table 2 and Fig. 4 show that the control group had a mean knowledge score of 20.37 ± 2.21 in Assessment I, which declined to 19.17 ± 3.17 in Assessment II and then slightly improved to 20.40 ± 1.61 in Assessment III, indicating only minor fluctuation across the three assessments. The within-subjects effect was not statistically significant, $F = 2.371, p = .102$, suggesting that the change in knowledge over time within the control group was not meaningful, while the between-subjects effect was highly significant, $F = 7136.976$, $p = .001$, indicating a significant difference in knowledge scores between the compared measures.

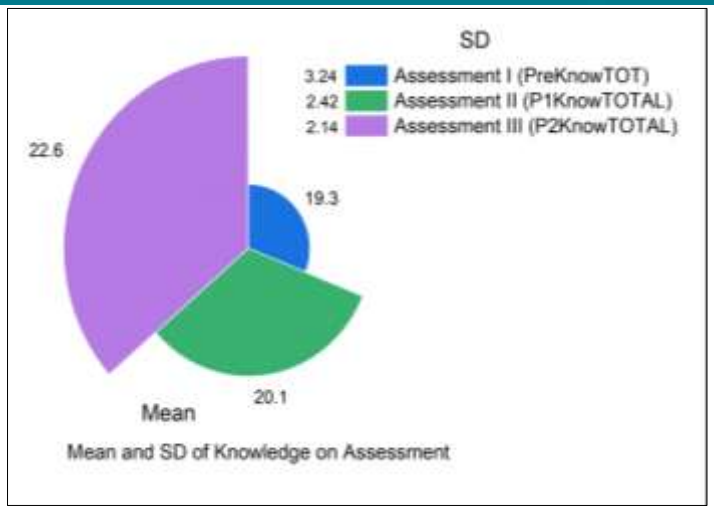

Fig. 5 Mean and SD of knowledge between assessments in study group

Table 3 Comparison of Mean and SD of Knowledge Between Assessments in Study Group of Patients with Type 2 Diabetes Mellitus

Assessment	Max Score	Mean ± SD	Within-Subjects F & p Value	Between-Subjects F (p)
Assessment I (PreKnowTOT)	30	19.27 ± 3.24	F = 27.841 p < .001	F = 4545.356, p < .001
Assessment II (P1KnowTOTAL)		20.13 ± 2.42		
Assessment III (P2KnowTOTAL)		22.57 ± 2.14		

Table 3 shows a progressive improvement in knowledge scores across the three assessments among the study group of patients with type 2 diabetes mellitus, with the mean score increasing from 19.27 ± 3.24 in Assessment I (PreKnowTOT) to 20.13 ± 2.42 in Assessment II (P1KnowTOTAL) and 22.57 ± 2.14 in Assessment III (P2KnowTOTAL), out of a maximum score of 30. This upward trend indicates that knowledge levels improved over time, and the reduction in standard deviation suggests that scores became more consistent in the later assessments. The within-subjects result was statistically significant ($F = 27.841$, $p < .001$), demonstrating a significant change in knowledge across assessments, while the between-subjects effect was also highly significant ($F = 4545.356$, $p < .001$), confirming a meaningful difference among the assessment stages.

Post Hoc Analysis of Knowledge Scores in Control and Study Group of Patients with Type 2 Diabetes Mellitus

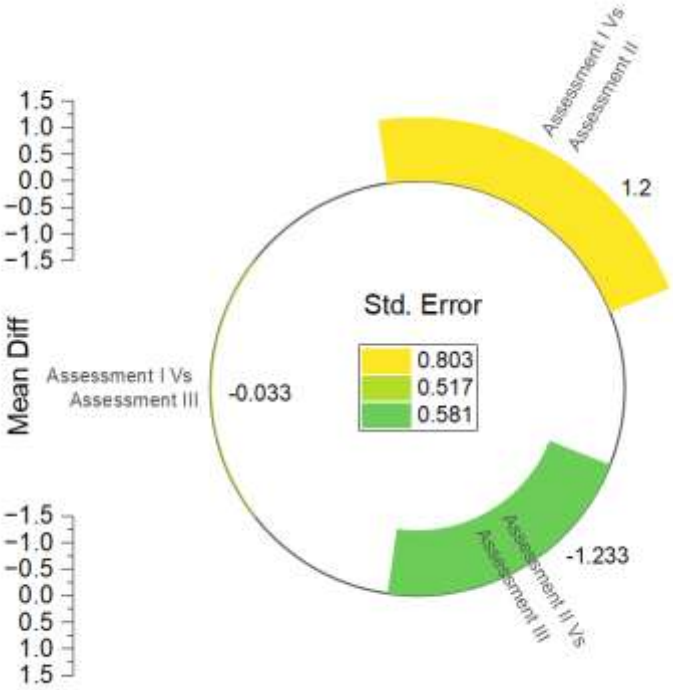

Fig. 6 Mean difference and standard error of knowledge scores in control group (Post Hoc analysis)

Table 4 Post Hoc Analysis (Pairwise Comparison) of Knowledge Scores in Control Group of Patients with Type 2 Diabetes Mellitus

Comparison	Mean Diff	Std. Error	P value	95% Confidence Interval	
				Lower Bound	Upper Bound
Assessment I Vs **Assessment II**	1.200	.803	.146	-.442	2.842
Assessment I Vs **Assessment III**	-.033	.517	.949	-1.092	1.025
Assessment II Vs **Assessment III**	-1.233*	.581	.042	-2.421	-.046

Table 4 and Fig. 6 indicates that the majority of participants in both the control and study groups had adequate knowledge in Assessment I, with 63.3% (n=19) in the control group and 73.3% (n=22) in the study group, while 33.3% (n=10) and 26.7% (n=8), respectively, had moderately adequate knowledge and only 3.3% (n=1) of the control group needed improvement, with no participants in the study group falling into this category; however, the between-group difference was not statistically significant ($\chi^2 = 1.442$, df = 2, p = 0.486). In Assessment II, the proportion with adequate knowledge decreased to 23.3% (n=7) in the control group and 13.3% (n=4) in the study group, whereas moderately adequate knowledge increased to 76.7% (n=23) in both groups and 10.0% (n=3) of the study group required improvement, yet this difference remained statistically nonsignificant ($\chi^2 = 3.818$, df = 2, p = 0.148). By Assessment III, a marked shift was observed, with 56.7% (n=17) of the control group showing adequate knowledge and 43.3% (n=13) showing moderately adequate knowledge, whereas the study group had only 10.0% (n=3) with adequate knowledge and 90.0% (n=27) with moderately adequate knowledge; this difference was highly significant ($\chi^2 = 14.700$, df = 1, p = 0.000), indicating a significant divergence in knowledge level distribution between the two groups at the final assessment.

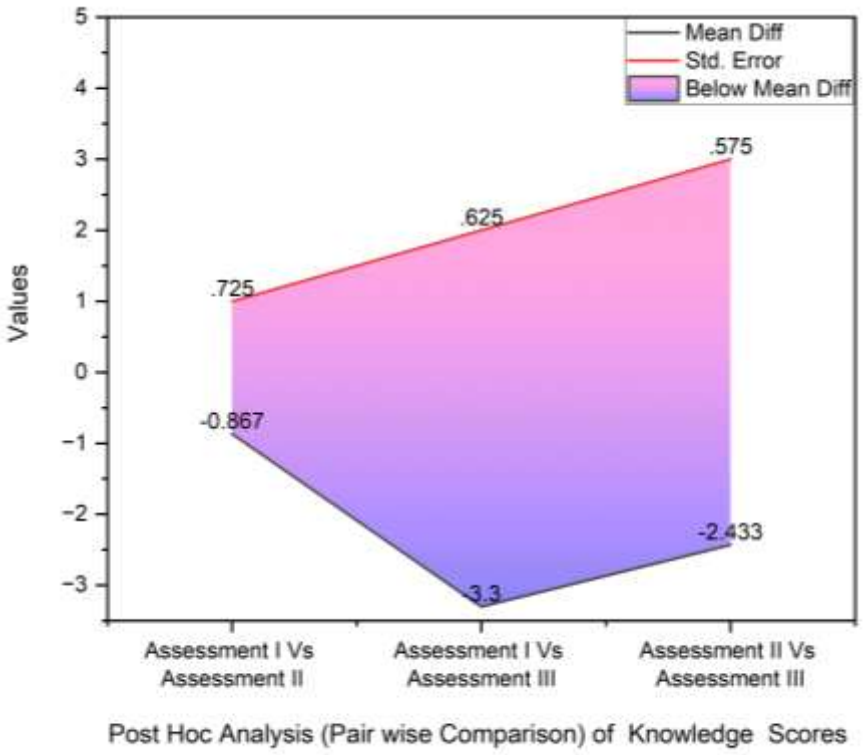

Fig. 7 Mean difference and standard error of knowledge scores in study group (Post Hoc analysis)

Table 5 Post Hoc Analysis (Pairwise Comparison) of Knowledge Scores in Study Group patients with Type 2 Diabetes Mellitus

Comparison	Mean Diff	Std. Error	P value	95% Confidence Interval	
				Lower Bound	Upper Bound
Assessment I Vs **Assessment II**	-.867	.725	.242	-2.350	.616
Assessment I Vs **Assessment III**	-3.300*	.625	.000	-4.579	-2.021
Assessment II Vs **Assessment III**	-2.433*	.575	.000	-3.609	-1.258

The post hoc pairwise comparison of knowledge scores in the study group with type 2 diabetes mellitus showed no statistically significant difference between Assessment I and Assessment II, as the mean difference was -0.867 with a standard error of 0.725, a p value of 0.242, and a 95% confidence interval ranging from -2.350 to 0.616. In contrast, Assessment I versus Assessment III showed a significant reduction in scores with a mean difference of -3.300, standard error of 0.625, p value of 0.000, and confidence interval from -4.579 to -2.021, while Assessment II versus Assessment III also showed a significant reduction with a mean difference of -2.433, standard error of 0.575, p value of 0.000, and confidence interval from -3.609 to -1.258. Overall, the findings indicate that knowledge scores remained comparable between the first two assessments but improved significantly by the third assessment, suggesting a meaningful effect over time.

Comparison of Knowledge Scores between Control and Study Group of Patients with Type 2 Diabetes Mellitus in Pre and Post Tests

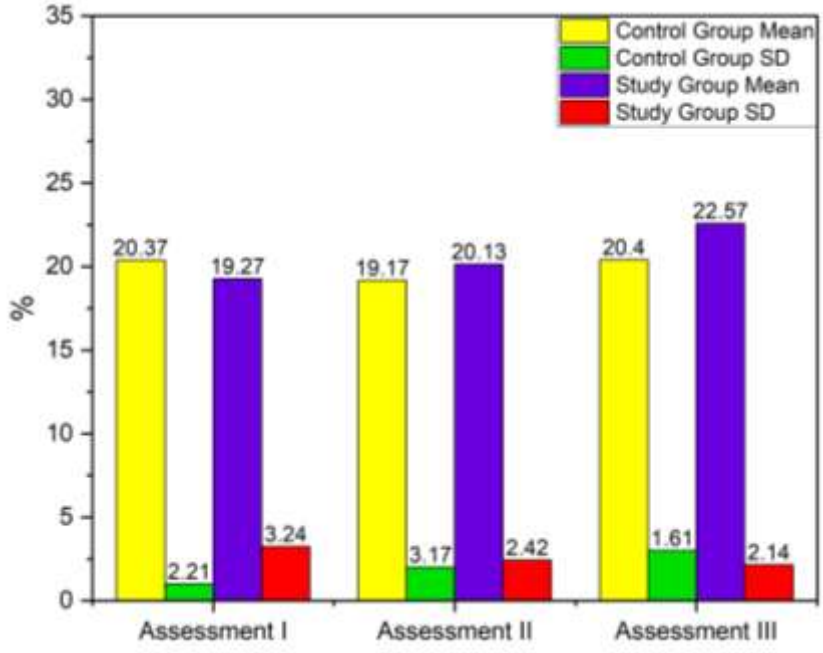

Fig. 8 Comparison of Mean and SD of Knowledge Between Control and Study Group of patients with Type 2 Diabetes Mellitus

Table 6 Comparison of Mean and SD of Knowledge Between Control and Study Group of patients with Type 2 Diabetes Mellitus

Assessments	Control Group Mean±SD (n=30)	Study Group Mean±SD (n=30)	Mean Diff	Ind t value	P value
Assessment I	20.37 ± 2.21	19.27 ± 3.24	–1.10	–1.538	0.129
Assessment II	19.17 ± 3.17	20.13 ± 2.42	0.97	1.327	0.190
Assessment III	20.40 ± 1.61	22.57 ± 2.14	2.17	4.425	0.000*

Table 6 shows that knowledge scores were comparable between the control and study groups at Assessment I and Assessment II, with no statistically significant difference observed in either case. In Assessment I, the control group recorded a mean score of 20.37 ± 2.21, while the study group had 19.27 ± 3.24, with a mean difference of -1.10, an independent t value of -1.538, and a p value of 0.129, indicating statistical non-significance. Similarly, in Assessment II, the control group scored 19.17 ± 3.17 compared with 20.13 ± 2.42 in the study group, yielding a mean difference of 0.97, a t value of 1.327, and a p value of 0.190, which also was not significant. However, Assessment III revealed a marked improvement in the study group, which obtained a mean score of 22.57 ± 2.14 compared with 20.40 ± 1.61 in the control group; the mean difference of 2.17, t value of 4.425, and p value of 0.000 indicate a highly significant difference in favor of the study group. Overall, the findings suggest that the intervention did not produce a significant effect in the initial assessments, but a significant positive impact was evident by Assessment III.

DISCUSSION

The present study demonstrated that the educational intervention was effective in improving knowledge regarding lower extremity perfusion among patients with type 2 diabetes mellitus. Although the control and study groups were comparable at baseline, a significant rise in knowledge was observed in the study group by the third assessment, while the control group showed only minor variation. This finding indicates that structured education can positively influence patients' understanding of lower-limb perfusion and related diabetic complications. Previous studies by Drovandi et al. (2024) and Yildirim et al. (2022) has similarly

shown that educational programs for diabetes-related foot disease significantly improve knowledge and self-care behaviors, and may also reduce the risk of ulceration and amputation (3,8).

The improvement noted in the study group is clinically important because lower extremity perfusion is closely linked to diabetic foot pathology, delayed healing, and limb-threatening complications. Education likely enhanced awareness of warning signs, daily foot surveillance, and timely health-seeking behavior, which are essential in prevention-oriented diabetes care. Systematic reviews have reported that patient education produces meaningful gains in foot-care knowledge and behavior, although repeated reinforcement may be necessary for sustained effects. In the present study, the gradual improvement across assessments supports the value of continued reinforcement rather than one-time instruction (3,9).

The findings also align with earlier intervention studies showing that intensive foot-care education improves knowledge and compliance more effectively than conventional teaching. However, some reviews caution that single educational strategies may be insufficient unless they are reinforced over time or integrated into broader care models. Therefore, the present results support incorporating targeted, repeated educational sessions into routine diabetic nursing practice. Such interventions may help patients maintain better foot-care knowledge, improve preventive behaviors, and ultimately reduce the burden of diabetic foot complications (10).

CONCLUSION

The present study demonstrated that the structured educational intervention was effective in improving knowledge regarding lower-extremity perfusion among patients with type 2 diabetes mellitus admitted to selected hospitals in Chennai. Across the three assessments, participants in the experimental group showed a consistent and statistically significant increase in knowledge scores, whereas the control group displayed only minimal fluctuation, indicating that routine care alone was insufficient to enhance understanding. The findings highlight that a focused, nurse-led teaching program, when delivered systematically and reinforced over time, can substantially strengthen patients' awareness of lower-extremity perfusion and its role in preventing foot complications, delayed wound healing, and potential amputation.

The use of psychometrically sound instruments further supports the credibility of the observed effects, suggesting that changes in scores reflect genuine gains in knowledge and not measurement error. These results underscore the importance of integrating structured educational interventions on peripheral perfusion and foot care into routine diabetes management, particularly for hospitalized patients at higher risk of vascular complications. By improving knowledge, such programs can foster better self-care practices, earlier recognition of warning signs, and more timely health-seeking behavior, ultimately contributing to the reduction of diabetes-related lower-limb morbidity.

Conflict of Interest: The authors certify that they have no involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this paper.

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References

1. Kumbhar S, Bhatia M. Advancements and best practices in diabetic foot Care: A comprehensive review of global progress. Diabetes Res Clin Pract. 2024;217:111845. doi: 10.1016/J.DIABRES.2024.111845
2. Zhang Q, Liu X, Li Q, Liu Y, He H, Wang K, et al. Quantitative model for assessment of lower-extremity perfusion in patients with diabetes. Med Phys. 2023;50(5):3019–26. [accessed 9 Jun 2026] Available from: https://pubmed.ncbi.nlm.nih.gov/36617729/
3. Drovandi A, Seng L, Golledge J. Effectiveness of educational interventions for diabetes-related foot disease: A systematic review and meta-analysis. Diabetes Metab Res Rev. 2024;40(3). [accessed 9 Jun 2026] Available from: https://pubmed.ncbi.nlm.nih.gov/37926437/
4. Fuentes-Peñaranda Y, Labarta-González-Vallarino A, Arroyo-Bello E, Gómez de Quero Córdoba M. Global Trends in Diabetic Foot Research (2004–2023): A Bibliometric Study Based on the Scopus Database. Int J Environ Res Public Health. 2025;22(4):463. [accessed 9 Jun 2026] Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12026514/

5. Drovandi A, Seng L, Golledge J. Effectiveness of educational interventions for diabetes-related foot disease: A systematic review and meta-analysis. Diabetes Metab Res Rev. 2024;40(3). [accessed 9 Jun 2026] Available from: https://pubmed.ncbi.nlm.nih.gov/37926437/
6. Pandey A, Kumar R, Singh SK. Effectiveness of educational intervention regarding foot care on knowledge among diabetes mellitus patients at selected health centers. Int J Community Med Public Health. 2021;8(1):291–5. [accessed 9 Jun 2026] Available from: https://www.ijcmph.com/index.php/ijcmph/article/view/7260
7. Zhang Q, Liu X, Li Q, Liu Y, He H, Wang K, et al. Quantitative model for assessment of lower-extremity perfusion in patients with diabetes. Med Phys. 2023;50(5):3019–26. [accessed 9 Jun 2026] Available from: https://pubmed.ncbi.nlm.nih.gov/36617729/
8. Yıldırım Ayaz E, Dincer B, Oğuz A. The Effect of Foot Care Education for Patients with Diabetes on Knowledge, Self-Efficacy and Behavior: Systematic Review and Meta-Analysis. Int J Low Extrem Wounds. 2022;21(3):234–53. [accessed 9 Jun 2026] Available from: https://pubmed.ncbi.nlm.nih.gov/35711163/
9. Valk GD, Kriegsman DMW, Assendelft WJJ. Patient education for preventing diabetic foot ulceration. A systematic review. Endocrinol Metab Clin North Am. 2002;31(3):633–58. [accessed 9 Jun 2026] Available from: https://pubmed.ncbi.nlm.nih.gov/12227125/
10. Barth R, Campbell L V., Allen S, Jupp JJ, Chisholm DJ. Intensive education improves knowledge, compliance, and foot problems in type 2 diabetes. Diabet Med. 1991;8(2):111–7. [accessed 9 Jun 2026] Available from: https://pubmed.ncbi.nlm.nih.gov/1827394/