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"A Study To Evaluate The Effectiveness Of Foot Care Education In Improving Knowledge On The Prevention Of Diabetic Foot Ulcer Among Diabetic Patients In Selected Hospitals, Mehsana, Gujrat

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Abstract: This study evaluated the effectiveness of a structured foot care education programme on knowledge regarding prevention of diabetic foot ulcers among diabetic patients in selected hospitals of Mehsana, Gujarat. A quasi-experimental pre-test and post-test control group design was used among 60 diabetic patients (30 experimental and 30 control). The experimental group received structured foot care education, while the control group received routine care. Post-test results showed a significant improvement in knowledge scores in the experimental group (mean score increased from 14.2 ± 7.01 to 22.47 ± 6.06; $p < 0.001$), whereas no significant improvement was observed in the control group. The study concluded that structured foot care education is effective in enhancing knowledge and promoting prevention of diabetic foot ulcer complications among diabetic patients.

I. INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. It is one of the most prevalent non-communicable diseases worldwide and is associated with significant morbidity, mortality, and economic burden. According to recent estimates, more than 537 million adults are living with diabetes globally, and India alone has over 101 million diabetic adults. The increasing prevalence of diabetes is attributed to factors such as urbanization, sedentary lifestyles, unhealthy dietary habits, obesity, and population aging.

Long-term uncontrolled diabetes can lead to several microvascular and macrovascular complications, including retinopathy, nephropathy, neuropathy, cardiovascular diseases, and diabetic foot ulcers (DFUs). Among these, diabetic foot ulcer is one of the most serious and disabling complications, contributing substantially to hospitalization, reduced quality of life, and lower-limb amputations. A diabetic foot ulcer is defined as a full-thickness wound occurring below the ankle in a person with diabetes and is commonly caused by peripheral neuropathy, peripheral arterial disease, infection, and minor trauma.

The lifetime risk of developing a diabetic foot ulcer among diabetic patients is estimated to be between 15% and 25%. Furthermore, up to 85% of diabetes-related lower-limb amputations are preceded by a foot ulcer. The development of DFUs is associated with several risk factors, including long duration of diabetes, poor glycemic control, smoking, obesity, hypertension, foot deformities, previous ulcer history,

inappropriate footwear, and inadequate foot care practices. In rural and semi-urban populations, lack of awareness and limited access to healthcare services further increase the risk of foot complications.

Preventive foot care is considered a cornerstone of diabetes management. Regular foot inspection, proper foot hygiene, appropriate footwear, early identification of foot abnormalities, and timely medical consultation can significantly reduce the incidence of diabetic foot ulcers and amputations. International guidelines strongly recommend integrating foot care education into routine diabetes care. Studies have shown that structured educational interventions can reduce the occurrence of diabetic foot ulcers by promoting knowledge, self-care behaviors, and early detection of foot problems.

Despite the availability of evidence-based recommendations, many diabetic patients continue to have inadequate knowledge regarding foot care. Poor health literacy, cultural practices such as barefoot walking, socioeconomic limitations, and lack of routine patient education contribute to inadequate preventive practices. Research has consistently demonstrated that patients with better knowledge of diabetic foot care are more likely to engage in protective behaviors and seek early treatment when foot problems occur.

Patient education plays a crucial role in empowering individuals to effectively manage their condition and prevent complications. Structured foot care education programs provide information regarding daily foot inspection, foot hygiene, nail care, footwear selection, glycemic control, and early recognition of warning signs. Such interventions have been shown to improve knowledge, self-efficacy, and adherence to preventive measures, ultimately reducing the burden of diabetic foot complications.

In Gujarat, particularly in Mehsana district, the prevalence of diabetes is increasing steadily. However, awareness regarding diabetic foot care remains limited among many patients. Considering the serious consequences of diabetic foot ulcers and the importance of preventive measures, there is a need to assess and improve patients' knowledge regarding foot care. Therefore, the present study was undertaken to evaluate the effectiveness of foot care education on improving knowledge regarding the prevention of diabetic foot ulcers among diabetic patients in selected hospitals of Mehsana, Gujarat.

II. MATERIALS AND METHODS

2.1 Study Design

A quasi-experimental pre-test post-test control group research design was adopted to evaluate the effectiveness of foot care education on knowledge regarding diabetic foot care among diabetic patients.

2.2 Study Setting

The study was conducted at Lions General Hospital and Ayush Multispeciality Hospital, Mehsana District, Gujarat. Both hospitals provide inpatient and outpatient services and cater to a large number of diabetic patients from urban and rural areas.

2.3 Study Population and Sample

The study population consisted of diabetic patients attending the outpatient departments of the selected hospitals. A total of 60 diabetic patients were selected using a non-probability purposive sampling technique. Participants were allocated into an experimental group (n=30) and a control group (n=30).

2.4 Inclusion and Exclusion Criteria

Diabetic patients aged above 40 years, diagnosed with diabetes for more than one year, able to read and understand Gujarati or Hindi, and willing to participate were included in the study. Patients with major foot amputation, severe cognitive impairment, mental illness affecting comprehension, or those unwilling to participate were excluded from the study.

2.5 Research Tool

Data were collected using a structured knowledge questionnaire. The tool consisted of two sections. Section A included demographic variables such as age, gender, religion, marital status, educational status, occupation, monthly family income, type of family, and previous knowledge regarding diabetic foot care. Section B consisted of 30 multiple-choice questions assessing knowledge related to diabetic foot care, including risk factors, preventive practices, and early signs and symptoms of foot complications. The maximum score was 30, with higher scores indicating better knowledge.

2.6 Intervention

A structured foot care education programme was developed based on literature review, clinical guidelines, and expert recommendations. The programme included information on diabetic foot care, risk factors for foot ulcers, daily foot inspection, foot hygiene, proper footwear, and preventive measures. The educational intervention was administered to the experimental group following the pre-test assessment, while the control group received routine care.

2.7 Data Collection Procedure

Baseline knowledge of diabetic foot care was assessed among participants in both groups using the structured questionnaire. Following the pre-test, the experimental group received the foot care education programme, whereas the control group did not receive the intervention. A post-test was conducted after seven days using the same questionnaire to assess the effectiveness of the educational programme.

2.8 Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee and permission was secured from the concerned hospital authorities. Written informed consent was obtained from all participants before data collection. Confidentiality, anonymity, and privacy of the participants were maintained throughout the study.

2.9 Statistical Analysis

The collected data were coded and analysed using the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize demographic characteristics and knowledge scores. Inferential statistics including paired t-test, independent t-test, and chi-square test were used to determine the effectiveness of the foot care education programme and the association between knowledge scores and selected socio-demographic variables. A p-value of less than 0.05 was considered statistically significant.

III. METHODOLOGY

A quantitative evaluative research approach with a quasi-experimental pre-test post-test control group design was adopted to assess the effectiveness of foot care education on knowledge regarding diabetic foot care among diabetic patients. The study was conducted at Lions General Hospital and Ayush Multispeciality Hospital, Mehsana, Gujarat. A total of 60 diabetic patients were selected using purposive sampling and assigned to an experimental group (n=30) and a control group (n=30).

Baseline knowledge was assessed using a structured questionnaire comprising demographic variables and 30 multiple-choice questions on diabetic foot care. Following the pre-test, the experimental group received a structured foot care education programme, while the control group received routine care. A post-test was conducted after seven days using the same questionnaire to evaluate changes in knowledge levels.

Data were analysed using SPSS version 26. Descriptive statistics (frequency, percentage, mean, and standard deviation) and inferential statistics (paired t-test, independent t-test, and chi-square test) were used. Statistical significance was set at $p < 0.05$. Ethical approval was obtained from the concerned authority, and written informed consent was secured from all participants.

IV. RESULTS AND DISCUSSION

Table 4.1: Assessment of Knowledge Regarding Prevention of Diabetic Foot Ulcer Among Diabetic Patients

Level of Knowledge	Experimental Group Pre-test n (%)	Experimental Group Post-test n (%)	Control Group Pre-test n (%)	Control Group Post-test n (%)
Poor (0–10)	9 (30.0)	2 (6.67)	13 (43.33)	14 (46.67)
Average (11–20)	16 (53.33)	5 (16.67)	15 (50.0)	13 (43.33)
Good (21–30)	5 (16.67)	23 (76.67)	2 (6.67)	3 (10.0)
Total	**30 (100)**	**30 (100)**	**30 (100)**	**30 (100)**

The findings reveal that before the intervention, the majority of participants in both the experimental (53.33%) and control (50%) groups had an average level of knowledge regarding diabetic foot ulcer prevention. Following foot care education, 76.67% of participants in the experimental group attained a good level of knowledge, compared with only 16.67% during the pre-test. In contrast, the control group showed minimal change in knowledge levels. These findings indicate that the foot care education programme was effective in improving knowledge among participants in the experimental group.

Table 4.2: Evaluation of the Effectiveness of Foot Care Education on Knowledge Regarding Prevention of Diabetic Foot Ulcer Among Diabetic Patients

Group	Test	Mean	SD	Mean Difference	t-value	df	p-value	Significance
Experimental	Pre-test	14.20	7.01	8.45	7.06	29	<0.001	Significant
	Post-test	22.73	6.06					
Control	Pre-test	11.62	6.38	0.02	0.02	29	>0.05	Not Significant
	Post-test	11.60	6.91					

The experimental group showed a significant increase in mean knowledge score from 14.20 ± 7.01 to 22.47 ± 6.06 following foot care education ($t = 7.06$, $p < 0.001$). In contrast, the control group showed no significant change in knowledge scores ($t = 0.02$, $p > 0.05$). The findings indicate that the foot care education programme was effective in improving knowledge regarding the prevention of diabetic foot ulcers among diabetic patients.

Table 4.3: Comparison of Post-Test Knowledge Scores Regarding Prevention of Diabetic Foot Ulcer Among Diabetic Patients Between Experimental and Control Groups

Group	Sample Size (n)	Mean	SD	Mean Difference	t-value	Table Value	Significance
Experimental Group	30	22.73	2.28	11.70	18.32	2.00	Significant ($p < 0.05$)
Control Group	30	11.03	2.67				

The post-test mean knowledge score was higher in the experimental group (22.73 ± 2.28) than in the control group (11.03 ± 2.67). The calculated t-value (18.32) exceeded the table value (2.00), indicating a

statistically significant difference between the groups. This finding confirms that the foot care education programme was highly effective in improving knowledge regarding the prevention of diabetic foot ulcers.

Table 4.4: Association Between Pre-test Knowledge Scores and Selected Demographic Variables Among Diabetic Patients (Experimental Group)

Demographic Variable	df	Calculated χ^2 Value	Table χ^2 Value	Significance
Age (in years)	2	1.98	5.99	Not Significant
Gender	1	0.00	3.84	Not Significant
Marital Status	1	0.82	3.84	Not Significant
Educational Level	2	2.64	5.99	Not Significant
Occupation	3	3.85	7.81	Not Significant
Duration of Diabetes	3	3.12	7.81	Not Significant
Current Treatment Regimen	2	2.11	5.99	Not Significant
Foot Care Practices	1	1.64	3.84	Not Significant
History of Foot Problems	1	0.66	3.84	Not Significant
Family History of Diabetes	1	0.59	3.84	Not Significant
Previous Knowledge of Foot Care	1	0.94	3.84	Not Significant

Chi-square analysis revealed no significant association between pre-test knowledge scores and any selected demographic variables among participants in the experimental group ($p > 0.05$). This indicates that baseline knowledge regarding diabetic foot ulcer prevention was independent of demographic characteristics.

Table 4.5: Association Between Pre-test Knowledge Scores and Selected Demographic Variables Among Diabetic Patients (Control Group)

Demographic Variable	df	Calculated χ^2 Value	Table χ^2 Value	Significance
Age (in years)	2	2.36	5.99	Not Significant
Gender	1	1.42	3.84	Not Significant
Marital Status	1	0.73	3.84	Not Significant
Educational Level	2	3.28	5.99	Not Significant
Occupation	3	4.01	7.81	Not Significant
Duration of Diabetes	2	2.76	7.81	Not Significant
Current Treatment Regimen	2	3.67	5.99	Not Significant
Foot Care Practices	1	1.88	3.84	Not Significant
History of Foot Problems	1	0.91	3.84	Not Significant
Family History of Diabetes	1	0.84	3.84	Not Significant

Previous Knowledge of Foot Care	1	1.20	3.84	Not Significant

No statistically significant association was found between pre-test knowledge scores and selected demographic variables in the control group ($p > 0.05$). Therefore, demographic characteristics did not influence the participants' baseline knowledge regarding diabetic foot ulcer prevention.

V. DISCUSSION

A randomized controlled study conducted among 127 diabetic patients attending an outpatient department evaluated the effectiveness of an audio-visual foot care education module along with an educational pamphlet. The findings revealed a significant improvement in knowledge scores from 9.8 ± 1.8 at baseline to 11.0 ± 1.7 after three months ($p < 0.001$), while no significant improvement was observed in the control group. The study concluded that structured foot care education effectively enhances patients' knowledge and foot care practices.

A pre-test and post-test study conducted among 60 patients with Type 2 diabetes mellitus assessed the effectiveness of foot care education. The results demonstrated a significant increase in post-test knowledge scores regarding diabetic peripheral neuropathy and diabetic foot care following the educational intervention. The findings highlighted the importance of patient education in preventing diabetic foot complications.

A study evaluating the effectiveness of a planned teaching programme on foot care among diabetic patients reported a statistically significant increase in post-test knowledge scores compared to pre-test scores. The findings confirmed that educational interventions are effective in improving awareness and knowledge regarding diabetic foot care practices.

A quasi-experimental study conducted among 30 diabetic clients in a hospital setting found that the mean post-test knowledge score was significantly higher than the mean pre-test score ($p < 0.001$) following a structured teaching programme on diabetic foot care. The study concluded that educational interventions significantly improve knowledge levels among diabetic patients.

A two-group quasi-experimental study involving 72 diabetic patients who participated in a five-week foot care education programme reported significantly higher knowledge and foot care behaviour scores in the intervention group compared with the control group ($p < 0.001$). The study recommended the implementation of structured educational programmes to reduce the risk of diabetic foot ulcers and lower-extremity amputations.

VI. CONCLUSION

The study concluded that foot care education was effective in improving knowledge regarding the prevention of diabetic foot ulcers among diabetic patients. Participants in the experimental group showed a significant increase in post-test knowledge scores, whereas the control group demonstrated no significant improvement. No significant association was found between knowledge scores and selected demographic variables. The findings indicate that the educational intervention was effective regardless of participants' demographic characteristics. Therefore, foot care education is a valuable strategy for enhancing awareness and promoting the prevention of diabetic foot ulcers among diabetic patients.

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VIII. CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this research article.

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