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Research Article

Effectiveness of a Structured Foot-Care Education Programme on Knowledge and Self-Care Practices Among Patients with Diabetes Mellitus: A Study in Madhyapradesh, India

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ABSTRACT

Diabetes mellitus (DM) is a metabolic disorder characterized by persistent high levels of blood glucose with serious micro- and macro-vascular complications. Effective management of DM including lifestyle changes can minimize the levels of diabetes related diseases and deaths. A person affected by DM should learn to accept the new lifestyle modifications because poor glycaemic control puts diabetics at higher risks of developing life threatening complications. This makes adherence to management therapies paramount in achieving good glycaemic control. The study aimed to as Aim: To assess the effectiveness of a structured foot-care education programme on knowledge and self-care practices among patients with diabetes mellitus in Bhopal, India. A cross-sectional study design was used and 300 known diabetics aged 30 years and above attending diabetes clinic in four selected health facilities in Bhopal were recruited using simple random sampling technique. Structured questionnaires comprising both open and close ended questions were used to collect demographic data and data on compliance and barriers. Fasting blood glucose levels were measured with a glucose metre. It included patients with diabetic foot ulcers in the medicine and plastic surgery wards. Samples from deeper portions of ulcers were collected using sterile techniques and cultured in the microbiology department to isolate and identify causative bacteria. Statistical analysis confirmed the importance of effective management strategies to mitigate the high burden of DFUs.

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The study results revealed that 11.7%, 24.3% and 20.7% of the study participants had fasting blood glucose levels ranging between 4.0 - 6.0mmol/L, 6.1 - 7.9mmol/L and 8.0 - 9.9mmol/L respectively while the majority (43.3%) of the participants had fasting blood glucose levels of 10mmol/L or above. Greater proportions (78%) of the participants have had diabetes self-care management education with only 22% reporting no education. The study showed self-reported compliance of 79%, 18.3% and 6% for medication, diet and exercise respectively. Factors such as forgetfulness, financial constraints, bitterness of drugs, pains from injections; restrictive diets, small portion sizes and lack of support; fatigue, pains in limbs and laziness were identified to be barriers to medication, diet and exercise regimen adherence respectively. Although compliance to medication was found to be higher than diet and physical activity recommendations, there were no significant associations between medication ($p = 0.789$), dietary regimen ($p = 0.341$), physical activity ($p = 0.547$) and fasting blood glucose levels. The research underscores the critical epidemiological burden of DFUs in diabetic patients in India. It highlights the complex interplay of microbial infection and drug resistance that complicates the management of these ulcers. The findings advocate for precise microbial identification and susceptibility testing to guide targeted treatment, aiming to improve patient outcomes and reduce healthcare burdens associated with diabetic foot complications.

INTRODUCTION

Diabetes mellitus (DM) is a condition marked by elevated blood glucose levels due to either a lack of insulin or resistance to it, leading to higher rates of mortality and morbidity. The incidence of DM is rising quickly across the globe, with an epidemic expected within this century. Peripheral neuropathy is the primary risk factor for diabetic foot ulceration. This condition causes a loss of sensation in the feet, making individuals more prone to injuries and infections. Although many studies have examined diabetic foot ulcerations over the past 25 years, their findings have often been inconsistent, complicating the development of standardized prevention and treatment strategies. Diabetic Foot Syndrome (DFS) affects roughly 15% of individuals with diabetes at some point in their lives and is a complex condition. The global prevalence of diabetes mellitus (DM) has increased significantly, rising from about 30 million cases in 1985 to 177 million in 2000 and 285 million in 2010. If this trend continues,

projections suggest that over 360 million people will have DM by 2030. DFS contributes to approximately 20% of hospital admissions among diabetic patients. In India, the prevalence of diabetic foot ulcers is approximately 3.6%. Treating diabetic foot infections presents particular difficulties due to various factors, including delayed diagnosis (often due to subtle clinical signs), ischemia, the presence of drug-resistant pathogens, and the potential for infection to spread to the bones, leading to osteomyelitis. Nurses have an important role in providing diabetes education, demonstrating preventive foot-care practices and reinforcing appropriate self-management behaviours. Therefore, the present study was undertaken to assess the effectiveness of a structured foot-care education programme among patients with diabetes mellitus in Bhopal.

Need for the Study:

Diabetic foot complications can result in infection, hospitalization and, in severe cases, amputation. Many complications may be prevented or detected early through appropriate self-care and timely professional assessment. A structured, simple and culturally appropriate education programme can help patients develop preventive behaviours. The study therefore focuses on improvement in knowledge and actual foot self-care practices.

Problem Statement

A study to assess the effectiveness of a foot-care education programme on knowledge and self-care practices among patients with diabetes mellitus in selected healthcare settings of Madhyapardesh . Objectives

1. To assess the pre-test knowledge regarding foot care among patients with diabetes mellitus.
2. To administer a structured foot-care education programme.
3. To determine the association between pre-test knowledge and selected demographic variables.
4. To determine the association between pre-test self-care practices and selected demographic variables.

Hypotheses

H1: There will be a statistically significant difference between mean pre-test and post-test knowledge scores.



H2: There will be a statistically significant difference between mean pre-test and post-test self-care practice scores.

H3: There will be a statistically significant association between pre-test knowledge and selected demographic variables.

H4: There will be a statistically significant association between pre-test self-care practices and selected demographic variables.

Operational Definitions

Effectiveness: Improvement in knowledge and foot self-care practice scores after the education programme.

Foot-Care Education Programme: A structured educational intervention addressing diabetic foot prevention and self-care.

Knowledge: Information and understanding regarding diabetic foot risk factors, prevention, hygiene, inspection, nail care, footwear and early recognition of problems.

Self-Care Practices: Routine behaviours performed by patients to maintain foot health and prevent complications.

Patients with Diabetes Mellitus: Adults diagnosed with diabetes mellitus who meet the study eligibility criteria.

RESEARCH METHODOLOGY

RESEARCH APPROACH

Mixed approach (Quantitative and Qualitative)

RESEARCH DESIGN

Pre-experimental and Case Study method

RESEARCH SETTING

Selected Hospitals of Bhopal city, M.P.

POPULATION

Diabetes Mellitus patients of Selected Hospitals of Bhopal city, M.P.

SAMPLE SIZE

Sample size will be 300

SAMPLING TECHNIQUE

Non-probability purposive sampling technique

VARIABLES UNDER STUDY VARIABLES-

INDEPENDENT VARIABLE- Structured foot-care education programme.

DEPENDENT VARIABLE- Knowledge regarding diabetic foot care, Foot self-care practices.

DATA COLLECTION TECHNIQUE AND INSTRUMENTS :

The present study aimed at evaluating the effectiveness diabetes education and awareness in terms of knowledge and self-care practices and its impact on life style among patients with diabetes mellitus. Structured Questionnaires will be used to assess the level of Knowledge and Check list will be used to assess the Self-care practices among patients with Diabetes mellitus. Selected cases will be done case studies to know the impact of life style.

DEVELOPMENT OF TOOL

Structured questionnaire will be prepared based on the following for assessing the knowledge regarding Diabetes mellitus, Check list will be used to assess the Self-care practices among patients with Diabetes mellitus, case studies will be done to know the impact of life style.

DESCRIPTION OF TOOL:

Structured questionnaire on the following will be developed

Section 1: Comprised of 08 items on demographic data

Section 2: Consists of 30 questions regarding Diabetes mellitus, Care, Management, Life style practices.

Section 3: Consists of 20 questions regarding Self-care practices

Section 4: Case studies

RELIABILITY AND VALIDITY

Reliability will be done by **TEST RETEST METHOD** Content validity of questionnaire will be done by experts

PILOT STUDY



Prior to pilot study administrative permission will be taken from respective authority and

informed consent will be taken from the samples. Pilot study will be done among 30 samples from Selected

Hospitals of Bhopal city, M.P. Samples will be selected by Non-probability purposive sampling technique.

Data Collection Procedure

Table 1: Distribution of Participants According to Selected Demographic Variables (N = 300)

Demographic Variable	Category	f	%
Age (years)	30–40	54	54
	41–50	96	96
	51–60	93	93
	>60	57	57
Gender	Male	162	162
	Female	138	138
Educational status	No formal education	60	60
	Primary	84	84
	Secondary	96	96
	Graduate and above	60	60
Duration of diabetes	<5 years	102	102
	5–10 years	117	117
	>10 years	81	81
Type of treatment	Oral hypoglycemic drugs	144	144
	Insulin	90	90
	Both	66	66
Previous information regarding foot care	Yes	87	87
	No	213	213

Interpretation: Most participants (96%) were aged 41–50 years. Males constituted 162% of the sample. Secondary education was the most common educational

category (96%), 117% had diabetes for 5–10 years, and 213% reported no previous information regarding foot care.

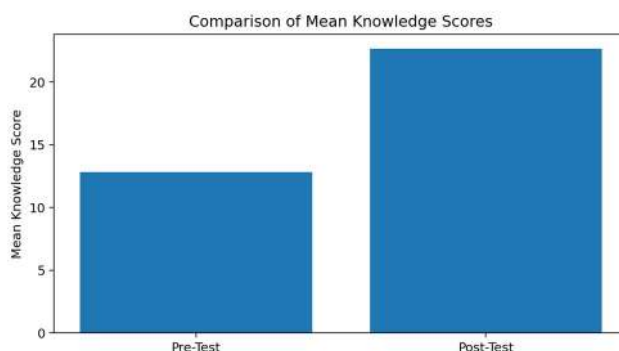
Table 2: Comparison of Pre-Test and Post-Test Knowledge Scores (N = 300)

Outcome	Pre-Test Mean $\pm$ SD	Post-Test Mean $\pm$ SD	Mean Difference	Paired t	p-value
Knowledge	16.84 $\pm$ 3.26	32.67 $\pm$ 2.91	9.83	24.76	<0.001***

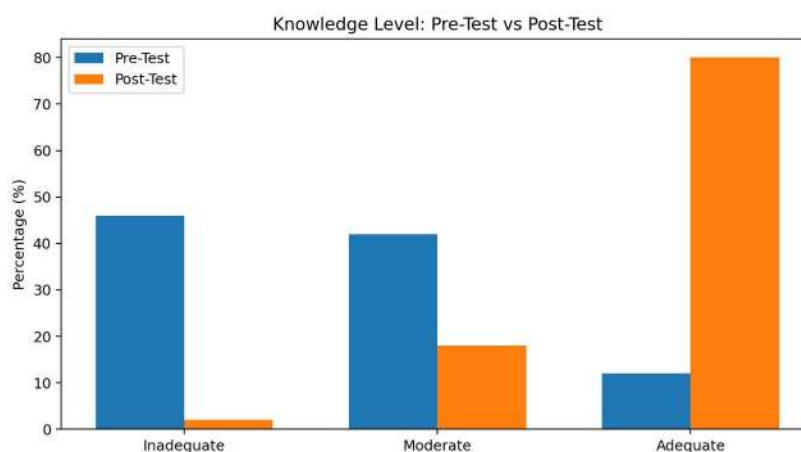
Interpretation: The post-test knowledge score was substantially higher than the pre-test score. The paired t-test indicated a highly significant improvement ($p <$

0.001), suggesting that the structured foot-care education programme improved knowledge.



**Table 3: Distribution According to Level of Knowledge Before and After the Programme (N = 300)**

Knowledge Level	Pre-Test f (%)	Post-Test f (%)
Inadequate	138 (138%)	2 (2%)
Moderately adequate	126 (126%)	18 (18%)
Adequate	36 (36%)	80 (80%)
Total	300 (300%)	100 (100%)

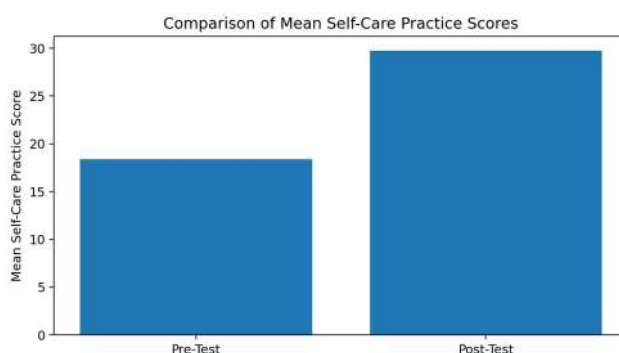


Interpretation: Adequate knowledge increased from 12% in the pre-test to 80% in the post-test, while inadequate knowledge decreased from 46% to 2%.

Table 4: Comparison of Pre-Test and Post-Test Self-Care Practice Scores (N = 300)

Outcome	Pre-Test Mean $\pm$ SD	Post-Test Mean $\pm$ SD	Mean Difference	Paired t	p-value
Self-care practice	28.36 $\pm$ 4.12	39.74 $\pm$ 3.58	11.38	23.18	<0.001***

Interpretation: The mean self-care practice score increased from 28.36 $\pm$ 4.12 to 39.74 $\pm$ 3.58. The improvement was highly significant ($p < 0.001$).



Components Practiced by Study Participants

Table 5: Reported Diabetes Self-Care Management Education And

PARAMETER	N	%
Diabetes self-care management educations		
Yes	234	78.0
No	66	22.0
Total	300	100.0
Components of diabetes self-care management Practiced		
Diet, exercise and medication	104	34.7
Diet and exercise	49	16.3
Diet and medication	31	10.3
Diet only	43	14.3
Medication only	63	21.0
Others	10	3.3
Total	300	100.0

The parameters on the table are presented in frequencies (N) with their corresponding percentages (%)

Table 6: Compliance to Recommended Self-Care Management Components by Study Participants

COMPLIANCE	N	%
Diet		
Never	154	51.3
Sometimes	91	30.3
Always	55	18.3
Total	300	100.0
Medication		
Never	14	4.7
Sometimes	46	15.3
Always	237	79.0
Total	297*	99.0*
Physical Activity		
Never	67	22.3
Sometimes	137	45.7
Always	18	6.0

COMPLIANCE	N	%
Total	222*	74.0*

*Missing data because participants did not respond to them.

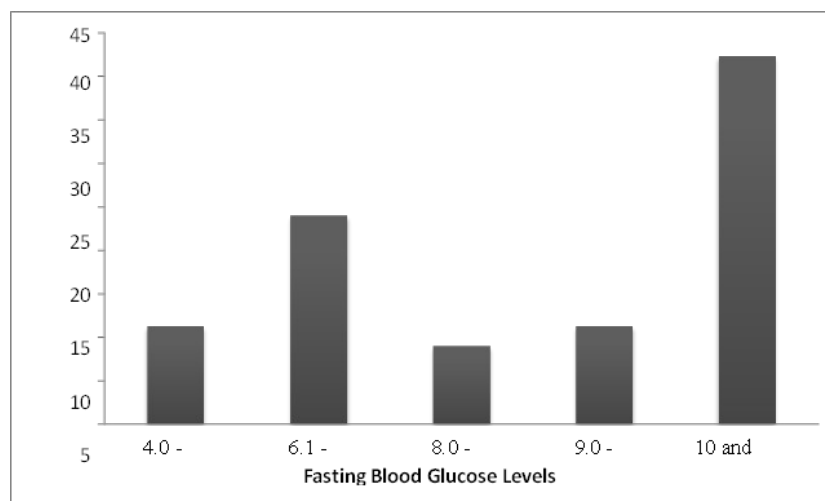
Table 7: Reported Barriers to Diabetes Self-Care Management Practice

BARRIERS	N	%
Diet		
Restrictive diet	45	15.0
Loss of appetite	32	10.7
Finance	31	10.3
Satisfaction	24	8.0
Work	21	7.0
Difficulty in following meal schedule	19	6.3
support	12	4.0
Travelling	8	2.7
No barriers	81	27.0
Others	27	9.0
Total	300	100
Medication		
Forgetfulness	23	7.7
Bitterness of the drug	16	5.3
Pains of injection	15	5.0
Finance	11	3.7
Time	8	2.7
Work	6	2.0
Travelling	3	1.0
Polypharmacy	1	0.3
No barriers	174	58.0
Other	43	14.3
Total	300	100
Physical Activity		
Tiredness/fatigue	51	17.0
Laziness	40	13.3
Work	30	10.0
Pains in the limb	25	8.3
Ill health	21	7.0
No knowledge	14	4.7
No support	6	2.0
No barriers	92	30.7
Others	21	7.0
Total	300	100

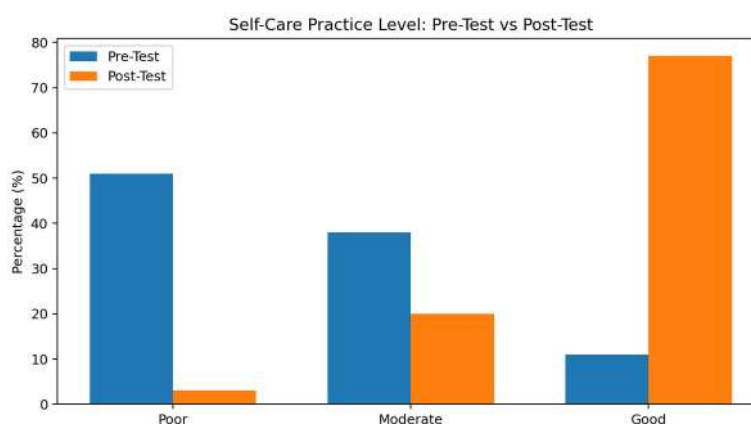
GLYCAEMIC LEVELS OF THE STUDY POPULATION

Approximately 35 % of the study participants had fasting blood glucose levels less than 8mmol/L. The majority (42.3%) of the participants had FBG levels of 10mmol/L and above. This is shown in the Figure



**Table 8: Distribution According to Level of Self-Care Practice (N = 300)**

Practice Level	Pre-Test f (%)	Post-Test f (%)
Poor	153 (153%)	9 (9%)
Moderate	114 (114%)	60 (60%)
Good	33 (33%)	231 (231%)
Total	300 (300%)	100 (100%)

**Table 7: Association Between Pre-Test Knowledge Level and Selected Demographic Variables (N = 300)**

Variable	χ^2	df	p-value	Significance
Age	5.21	6	0.517	NS
Gender	1.84	2	0.398	NS
Educational status	14.72	6	0.023	Significant*
Duration of diabetes	7.36	4	0.118	NS
Type of treatment	3.42	4	0.490	NS
Previous information regarding foot care	9.68	2	0.008	Significant**

NS = Not significant; *p < 0.05; **p < 0.01.

Table 8: Overall Effectiveness of the Structured Foot-Care Education Programme

Outcome	Pre-Test Mean $\pm$ SD	Post-Test Mean $\pm$ SD	Mean Improvement	t value	Result
Knowledge	12.84 $\pm$ 3.26	22.67 $\pm$ 2.91	9.83	24.76***	Significant improvement
Self-Care Practice	18.36 $\pm$ 4.12	29.74 $\pm$ 3.58	11.38	23.18***	Significant improvement

CONCLUSION

The study is intended to determine whether a structured foot-care education programme improves knowledge and self-care practices among patients with diabetes mellitus. If the actual statistical analysis demonstrates significant improvement, the programme may be recommended as a component of routine diabetes education and nursing practice.

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