

## **Effectiveness of nursing intervention on knowledge about foot self-care practices in diabetic patients with foot ulcer in south India-An interventional study**

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### **ABSTRACT**

**Background:** Diabetes is a metabolic disorder which is characterized by elevation in the blood sugar levels. Diabetes leads to multiple long-term complications of the various systems in the body. Foot ulcer accounts for significant morbidity, mortality and health care expenditure.

**Aim and objective.** The aim of this study was to access the effectiveness of nursing intervention to improve patients' foot self-care knowledge and skills practices in diabetic patients with foot ulcer in south India.

**Methods:** Quantitative and interventional research approach was adopted for this study, systematic random sampling was used to select 30 patients with diabetic foot ulcer, who fulfilled both the inclusion and exclusion criteria. A 60 second's tool: screening for high-risk diabetes foot, was used to assess the foot risk. Modified Nottingham Assessment of Functional Foot-care was used to assess foot care practices. RBS, HbA1C levels using hexokinase method and 10g monofilament were used to assess foot sensation.

**Results:** There has been a statistically significant difference between the pre-test and post-test levels of knowledge about foot self-care practices

**Conclusion:** The study showed that nursing interventions, IEC, foot care practices and counselling has a significant impact in reducing the foot ulcers and stress among the diabetic patients. Diabetic clinic should initiate interventional foot education program and foot self-care practices throughout the country.

**Keywords:** Bio-Physiological, Bio-Psychological Diabetes Mellitus, Foot Ulcer, Foot Care Practices,

### **Introduction**

Diabetes mellitus is one of the most common non communicable diseases. It involves various organs of the human body <sup>1</sup>. In 2019, 1.5 million deaths in which diabetes was a direct cause for these deaths <sup>2</sup>. Diabetes is certain to be one of the most challenging health problems in the 21st century, diabetes

epidemic is underway<sup>3</sup>. In 2019, approximately 463 million adults (20-79 years) were living with diabetes, it is predicting that by 2045 this figure will rise to 700 million<sup>4</sup>. Pooled prevalence of diabetic foot ulceration was about 6.3% globally<sup>5</sup>. Among the diabetes mellitus complications foot problems accounts for increase hospital admission than any of the deep-rooted complications. The lifetime risk of a patient with diabetes developing an ulcer is 25%. Up to 85% of all lower limb amputations in diabetes are preceded by foot ulcers<sup>6,7</sup>.

Foot ulcers are very expensive to treat and approximate 24.4 % of the total health care expenditure is consumed by diabetic patients with foot complication which poses a substantial amount of financial burden on our healthcare<sup>8,9</sup>.

One in seven diabetic patients accounts for foot ulcer, although the prevalence differs in various countries. Prevalence of diabetic foot ulceration in India was about 11.6%. Globally every 20 seconds a limb is lost due to diabetes. Diabetes causes destruction in the nerve cell especially those on the feet. Up to 25% of patients with diabetes have numbness in their feet which may develop foot ulcer for a lifetime<sup>10</sup>.

A diabetes patient might go through many complications; however, foot ulcers are the most devastating one. In diabetes mellitus patients, foot ulcers have a very significant effect on morbidity and mortality<sup>11</sup>.

Among diabetic population, 19%–34% is estimated for a lifetime risk of foot ulcers<sup>12</sup>. However, among diabetes complications, foot ulcers are considered as the most preventable one. Diabetes foot ulcers are preventable if detected at an early stage. Diabetes patients shall be made aware of the risk factors of diabetes, and they shall be educated about foot self-care practice<sup>13</sup>. Awareness and knowledge about foot self-care practice and risk of diabetes can prevent diabetes foot ulcer to a larger extent.

## Materials and Method

The research was conducted for a period of 6 months. The study was conducted among 30 study subjects. Research was conducted after obtaining approval of the Institutional Ethics Committee (IEC) of Saveetha Medical College Hospital (Ref No 001/01/2020/IEC/SMCH). In this study quantitative and interventional research approach and true experimental (pre-test, post-test design with control group) approach were followed. Systematic random sampling was used to select the study participants. 15 patients were included in the experimental group and 15 patients were participated for the control group. Sample size was estimated by using Sigma plot 13 software.

A 60 second tool: screening for high-risk diabetes foot was used to assess the foot risk, Structured Interview schedule was used to assess the knowledge on Diabetes & foot care.

The data was collected under four heads. **Firstly**, demographic data was obtained. **Secondly** foot risk was assessed. Type II diabetic clients were screened for high-risk diabetic using a 60 second tool which consists of 10 items answerable with “Yes” or “No”. All participants those who marked “Yes” on either foot were identified at risk for foot ulcer. **Thirdly**, Diabetic foot care questionnaire were provided to the subjects for accessing knowledge on diabetic and foot care. This questionnaire consists of 11 items for accessing knowledge on diabetic foot self-care practices in which each correct answer carried one point. **Fourthly**, Modified Nottingham Assessment of Functional Foot Care was used to assess the foot care practices. It consisted of 24 items; each question had four options with score ranging from 0 to 3 for each answer.

*Inclusion criteria consists of the following:*

- (1) Clients receiving treatment for Type II diabetes mellitus,
- (2) Age group between 30-58 years,

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- (3) Both genders, and
- (4) Duration of illness within 5 years were included in the study.
- (5) Clients who are risk of diabetic foot assessed with help of risk assessment tool

*Exclusion criteria consists of the following:*

- (1) Clients with physical disability,
- (2) Diabetes with any co- morbid diseases, and
- (3) Clients who had undergone any stress management programme were excluded from the study.

*Nursing Strategies:*

Information education communication package was used to educate the study participants as a nursing strategy. It included diabetes signs, its symptoms, its types, its complications, dietary management, lifestyle and medical management of patients with diabetes type II, specific foot complications, importance of foot care, self-practices of foot care, and management of foot problems. This education package was delivered for 45 mins using PPT and flash card. Inspection of feet, selection of shoes and socks and wound care were demonstrated through videos for a period of 10 mins and a foot care kit was provided to the participants which consists of 10gm monofilament, reflex hammer, padding, toe clipper, orthotics, nail cutters, nippers, filers, pumice stone, skin sponge, nail file, scissors and foot care cream. Individual counselling session was conducted according to the needs of the individual. Post-test was carried out after the intervention and in the interval of 3 & 6 months.

## Results

**Table 1: Socio demographic characteristics of the study participants**

Demographic profile		Group			
		Experiment(n=15)		Control(n=15)	
		n	%	n	%
Age	30-40 years	4	26.67%	4	26.67%
	41-50 years	5	33.33%	6	40.00%
	51-60 years	6	40.00%	5	33.33%
Gender	Female	7	46.67%	6	40.00%
	Male	8	53.33%	9	60.00%
Religion	Hindu	7	46.67%	6	40.00%
	Muslim	2	13.33%	4	26.67%
	Christian	6	40.00%	5	33.33%
Marital status	Married	12	80.00%	12	80.00%
	Unmarried	3	20.00%	3	20.00%
	Separated	0	0.00%	0	0.00%
	Widower	0	0.00%	0	0.00%
Education	Professional degree	4	26.67%	2	13.33%
	Graduate	7	46.67%	3	20.00%
	Intermediate/diploma	0	0.00%	0	0.00%
	High school	2	13.33%	6	40.00%
	Middle school	2	13.33%	4	26.67%
	Primary school	0	0.00%	0	0.00%
	Non-Illiterate	0	0.00%	0	0.00%
Occupation	Professional	1	6.67%	2	13.33%
	Semi professional	5	33.33%	8	53.33%

	Clerk/shop/farm	7	46.67%	3	20.00%
	Skilled worker	2	13.33%	2	13.33%
	Semi-skilled worker	0	0.00%	0	0.00%
	Unskilled worker	0	0.00%	0	0.00%
	Unemployed	0	0.00%	0	0.00%
Duration of illness	<1 year	0	0.00%	0	0.00%
	1-5 years	5	33.33%	8	53.33%
	6-10 years	10	66.67%	7	46.67%
	>11 years	0	0.00%	0	0.00%
Food habits	Vegetarian	4	26.67%	5	33.33%
	Non-Vegetarian	11	73.33%	10	66.67%
Heard about DM foot ulcer	Yes	3	20.00%	2	13.33%
	No	12	80.00%	13	86.67%

A total of 30 participants included in this study, each group contain 15 participants (experimental and control group). Table 1 shows that about half of the respondents in experimental group were 51-60 yrs. of age (40%) and half of the respondents in control group were 41-50 years of age (40%). Majority of the participants were males on both group ie, 53.3% male participates in experimental group and 60% in control group. Around half of the respondents were Hindus with 40 % in the control and 46.67% in the experimental group. Majority 80% of the respondents were married in both groups in the experimental and control groups. Around half the participants in experimental group were Graduate 46.67% and in 40% of the participants were complete high school education. Almost half (46.67%) of the respondents were Clerk/shop/farm in experimental group, and in control group more than half of the participants (53.3%) were semi-professionals.

A larger percentage of the respondents had the illness between 6-10 years of age (66.67%) in experimental group. Larger percentage of the respondents had the illness in control group 1-5 years of age (53.3%). Majority of them were non vegetarian (73.33%) in experimental group and in control group (66.67%). A large number of participants were not heard about DM foot ulcer (80%) in experimental and in control group (86.67%).

**Table 2. Knowledge score**

Min=0 Max=11 Total questions=11 Total score= 11

S no.	Grade	Score	Percentage
1.	Inadequate	0-5	0 – 50%
2.	Moderate	6-8	51 – 75%
3.	Adequate	9-11	76 – 100 %

**Table 3. Foot self-care knowledge**

Assessment		Group		

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	Level of Knowledge score	Experimental Group (n=15)		Control Group (n=15)		Chi-square value	P value
		No.	%	No.	%		
Knowledge	Inadequate	11	73.33%	12	80.00%	0.18	0.67 (NS) DF=1
	Moderate	4	26.67%	3	20.00%		
	Adequate	0	0.00%	0	0.00%		
	Satisfactory	4	26.67%	5	33.33%		
	Good	0	0.00%	0	0.00%		

Results from Table 2 shows that majority of the participants knowledge level about was inadequate in both groups, (11) 73.33% in experimental group and in (12) 80% control group. Results from Table 3 shows that study participants skill in self-foot care were poor, (11)73.33% in experimental group and (10) 66.67% in control group.

**Table 4: Comparison of experimental and control group Mean Knowledge score During Pre-test, Post-test-I, Post-test-II and Post-test-III**

Assessment	Group				Mean Difference	Student independent t=test
	Experimental (n=15)		Control (n=15)			
	Mean	SD	Mean	SD		
Pre-test	4.07	1.16	4.40	1.06	-0.33	t=0.82 P=0.42 DF=28 (NS)
Post-test-I	5.73	1.58	4.60	1.30	1.13	t=2.14P=0.04* DF=28 (S)
Post-test-II	7.20	2.60	4.73	1.44	2.47	t=3.21P=0.01** DF=28 (S)
Post-test-III	7.87	1.41	4.87	1.51	3.00	t=5.63 P=0.001*** DF=28 (S)

The above table shows that the comparison of experimental and control group knowledge score among diabetic clients during Pre-test, Post-Test-I, Post-test-II and Post-test-III. Considering the Pre-test knowledge score, there is no significant difference between experimental group and control group diabetic clients.

Considering the Post-test-I knowledge score, mean  $\pm$  SD, is 5.73 $\pm$ 1.58 in experimental group and 4.60 $\pm$ 1.30 in control group; p=0.04\*. Considering post-test-II knowledge score, mean  $\pm$  SD is 7.20 $\pm$ 2.60 in experimental group and 4.73 $\pm$ 1.44 in control group p=0.01\*\*, and considering the post-test III knowledge score, mean $\pm$  SD is 7.87 $\pm$ 1.41 in experimental group and 4.87 $\pm$ 1.51 in control group; p=0.001\*\*\*, there is a significant difference between experimental group and control group diabetic clients p value less than 0.05. It was confirmed using independent t test.

**Table 5: Comparison of mean Knowledge Score during Pre-test, Post-Test-I, Post-test-II and Post-test-III among experimental and control group**

	<i>Pre-test</i>		<i>Post-test I</i>		<i>Post-test-II</i>		<i>Post-test-III</i>		Mean difference	One-way Repeated measures ANOVA F-test
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		
<b>Experimental</b>	4.07	1.16	5.73	1.58	7.20	2.60	7.87	1.41	<b>3.80</b>	<b>F=13.90</b> <b>p=0.001**</b> <b>* (S)</b>
<b>Control</b>	4.40	1.06	4.60	1.30	4.73	1.44	4.87	1.51	0.47	F=2.00 p=0.12 (NS)

In experimental group, repeated measures F-test analysis shows that, mean knowledge score is statistically significant different between pre-test and post-test-III (F = 13.90, P ≤ 0.001\*\*\*). Therefore, we can conclude that a nursing intervention improves knowledge score significantly among diabetic clients.

Similarly, in control group, repeated measures F-test analysis shows that, mean knowledge score is not statistically significant different between pre-test and post-test-III (F = 2.00 P ≥ 0.05). Therefore, we can conclude that a routine care does not improve the knowledge score significantly among diabetic clients.

**Table 6: EFFECTIVENESS OF NURSING INTERVENTION AND GENERALIZATION OF KNOWLEDGE GAIN SCORE**

		Maximum Knowledge score	Mean Knowledge score	% Of Mean Knowledge score	% Of knowledge gain
Experimental	Pre-test	11	4.07	37.00 %	34.55%
	Post-test I	11	5.73	52.09 %	
	Post-test-II	11	7.20	65.45 %	
	Post-test-III	11	7.87	71.55 %	
Control	Pre-test	11	4.40	40.00 %	4.27%
	Post-test I	11	4.60	41.82 %	

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	Post-test-II	11	4.73	43.00 %
	Post-test-III	11	4.87	44.27 %

Above Table 6 shows the effectiveness of nursing intervention on knowledge score among diabetic clients. In experimental group, on an average, in post-test, after having nursing intervention, diabetic clients are gained 34.55% of knowledge score. In Control group, on an average, in post-test after having routine care diabetic clients are gained 4.27% of knowledge score. This difference shows the effectiveness of nursing intervention on knowledge gain score in experimental group.

### Discussion

This interventional study was conducted to assess the effectiveness of nursing intervention on knowledge about foot self-care practices among diabetics with foot ulcer. The study showed that the prevalence of foot ulcer was equal among men and women, about 80% of the total people were not aware of foot ulcer, and people who follow non-vegetarian diet had higher chances of getting foot ulcer because of the uncontrolled food habits. Several studies reported poor foot care practices among patients with diabetes. Kheir et al., reported poor practices toward regular inspection of feet among patients in Qatar<sup>14</sup>.

This study finding demonstrated that there is an increase knowledge score with a significant difference between the experimental and control group. It was confirmed using the independent t test. Among experimental group, repeated measures F-test analysis shows that the mean overall score is statistically different between pre-test and post-test ( $F=13.90$ ,  $P\leq 0.001$ ). On an average after the nursing intervention diabetic clients have gained 34.55% of knowledge score. So, the study showed that with the help of the nursing intervention the knowledge has gained among the experimental group about foot self-care practices.

The study showed that it is a reminder for the clinicians, nurses and other care professionals on addressing the importance of foot care practices among the diabetic clients to decrease the complication of foot problems. Thus, patients should be trained in the community centre, clinics and hospitals about foot ulcer prevention based on clinical practice guidelines for diabetes mellitus.

### Conclusion

The study concludes that majority of diabetic patients have a significant risk of developing foot ulcer. It also confirms that early detection and education at initial level reduces foot ulcer. It is utmost important for health care professionals to give education and knowledge regarding self-foot care practices to reduce foot ulcer which will have a major impact on the quality of life of diabetic patients.

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NIL

### Conflicts of Interest

There are no conflicts of interest in relation to the content of this article

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