

# **Effect of Educational Intervention On Practice of Diabetic Foot Ulcer Prevention Among Patients Attending Clinic in Lagos State University Teaching Hospital**

**Author(s)**, OGUNDIPE Olubunmi Abosede (RN, RM, RON, BNSc),

AND

POPOOLA, Rabiou Olalekan (RN, Ph.D)

## **Abstract:**

Ulceration of the feet, which can result in loss of limbs and even death, is one of the major health problems for people with diabetes mellitus, this may be attributed to inadequate knowledge about foot care among diabetic patients. This study assessed the effect of educational intervention on practice of diabetic foot ulcer prevention among patients attending out-patient clinic in Lagos State University Teaching Hospital Ikeja. One group pre-test and post-test quasi experimental design was chosen to carry out the research. The population were individuals diagnosed with diabetes mellitus during visit to Endocrinology clinic of Lagos State University Teaching Hospital Ikeja. A sample size of 39 was selected using total enumeration. Pretested questionnaire was used to collect data on knowledge regarding diabetic foot ulcer and self-reported foot care practices among diabetic patients' pre- intervention and post-intervention. Face and content validity of instruments were ensured. The reliability of the questionnaire was ascertained using Cronbach alpha and reliability coefficient was calculated to be 0.765. Data were processed through statistical package for social science (SPSS), version 21. Two research questions were answered through

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descriptive statistics of mean and standard deviation while the only hypothesis was tested using t- test at 0.05 level of significance. The results showed that there is significant effect in post-intervention training on practice regarding prevention of diabetic foot ulcer self-care activities with a mean practice score of 15.692 ( $p= 0.000$ ). Findings showed that self-care practice concerning prevention of diabetic foot ulcer among diabetic patients improved. It was recommended among others that health care providers should take time to explain in depth on diabetic foot ulcer, causes and prevention/control through health and self-foot care measures to prevent complications.

**Keywords:** diabetic foot, educational intervention, foot care, knowledge, self-reported practice,



About Author

**Author(s):**

**OGUNDIPE Olubunmi Abosede (RN, RM, RON, BNSc)**

Department of Adult Health Nursing,  
School of Nursing Science,  
Babcock University, Ilishan-Remo, Ogun State, Nigeria.

**And**

**POPOOLA, Rabi Olalekan (RN, Ph.D)**

Department of Adult Health Nursing,  
School of Nursing Science,  
Babcock University, Ilishan-Remo, Ogun State, Nigeria.



## Introduction

Diabetes is a chronic complex disease that requires continuous care, proper control and multifactorial strategies for risk reduction. (WHO, 2015), in a study have shown that there has been a progressive increase in the prevalence of diabetes in Nigeria and the burden is expected to increase even further. Out of the total number of adults with diabetes recorded in 2020 by IDF, Nigeria had the highest prevalence in the West African region, among which 1.7 million had diabetes mellitus complications. Diabetes can cause several severe complications that increase morbidity, mortality and health care cost (American Diabetes Association, 2019). Globally, 425 million adults (8.8%) between ages 20-79 years are living with diabetes mellitus (DM) which cause an annual death of about 4.0 million worldwide (International Diabetes Federation [IDF], 2019). A study in Nigeria reported complications that are specific to diabetes mellitus are retinopathy, nephropathy, neuropathy, diabetes foot ulcer among others (Chinenye & Ofoegbu, 2016).

The complications that are specific to diabetes mellitus include retinopathy, nephropathy, neuropathy, diabetes foot ulcer among others. Good management as well as adequate educational intervention of diabetes mellitus and foot ulcer prevent its complications and they include the use of medicines, interventions to promote healthy lifestyles, patient education to facilitate self-care, and regular screening for early detection and treatment of complications. The prevalence of diabetic foot ulcer has been found to be high in Nigeria, with Type 2 diabetes (T2DM) having 0.65% in rural Mangu (North), 6.8% in Port Harcourt city (Niger Delta), 11.0% in urban Lagos (Chinenye & Ogbera, 2015).

Diabetic foot problems are one of the most common chronic complications of diabetes that has a tremendous economic and social impact on individuals, families and on health system in developing and developed countries (Saleh, et al, 2015). The effects of the problem on individual, public and the nations is that most clients with diabetes mellitus come back for readmission soon after they were discharged from the hospital, prolonged hospital stay, increased spending of hospital bills, among others. These clients usually come back with complications (e.g. hyperglycaemic coma, neuropathy and foot damage). These complications may ultimately lead to effects such as amputations of the toe, foot or leg among individuals and the nation at large, which are a major orthopaedic concern (Shah, et al, 2016). The orthopaedic nurse bears the burden of caring for patients that come back with complications, and therefore must equip patient with adequate knowledge to maintain good glycaemic condition and improving outcome of care (Okun, et al, 2016).

Improper foot care in diabetics can lead to many complications such as infection, ulcerations, gangrene and amputations. Diabetic foot complications were attributed to the lack of knowledge about foot care among diabetic patients and the feet improper wear (Gawish, 2015). Diabetic foot problems can be prevented through well-coordinated foot care services. Regular inspection of the feet by health care professionals, regular podiatry and adjusted shoes and insoles are preventive measure of diabetic foot (Kotru, et al, 2015). The most essential element of any health program for diabetic foot ulcer prevention and control is patient adherence to practice of self-care (Abdelsalam, et al, 2017).

The practice of diabetic foot care includes daily foot examination, use of appropriate footwear to prevent foot ulcers development, check of water temperature before bath and



seek professional help for any problem (Abdelsalam, et al, 2017). Jeffcoate, et al (2016) found that daily foot inspection was the most common preventive measure in the prevention of foot ulcerations. Poor socio-economic condition, lack of proper diabetic foot care education, and incorrect footwear are factors associated with the development of diabetic foot ulcers. Brower, et al (2017) found that patients with a history of foot ulceration are at higher risk for the formation of new ulcers. Within one year of wound healing following ulceration, up to 40% of the clinic's patients with a positive ulcer history developed another ulcer.

The gap in research is that there exists poor practice in the prevention of Diabetic Foot Ulcer and most patients end up with their limbs being amputated. Despite various interventions, Diabetic Foot Ulcer remains a common and significant clinical problem affecting quality of life and quality of care that disrupts patients' psychological and physical state and has a negative impact on their overall perception of the disease (Aydin, et al., 2020). Therefore, this study aims to identify the risk of having diabetic foot ulcer among the DM patients, to assess the current level of foot care practices among diabetic patients, to implement an education intervention on lifestyle modification, foot care practices and appropriate diet, and to assess the effectiveness of intervention regarding foot care practice among diabetic patients in Lagos State University Teaching Hospital. The main objective of this study was to assess the effect of educational intervention on practice of diabetic foot ulcer prevention among patients attending out-patient clinic in Lagos State University Teaching Hospital Ikeja. The study specifically:

- i. assessed the pre- intervention self- reported practice of diabetic foot ulcer prevention;
- ii. implemented the intervention of diabetic foot ulcer prevention; and
- iii. determined post- intervention self-reported practice in preventing diabetic foot ulcer.

### Research Questions

1. What is the pre- intervention level of self-reported practice of foot care regarding prevention of diabetic foot ulcer among patients attending clinic in Lagos State University Teaching Hospital Ikeja?
2. What is the post- intervention level of self-reported practice of foot care regarding prevention of diabetic foot ulcer among patients attending out-patient clinic Lagos State University Teaching Hospital?

### Hypothesis

**Ho1:** There is no significant difference in the pre- intervention and post- intervention scores of self- reported foot care practice regarding prevention of diabetic foot ulcer.

### Methodology

A one group pre-test post-test quasi experimental design was used for the study. The study was carried out in Lagos State University Teaching Hospital (LASUTH) Ikeja Lagos. The target population for the research study were eligible patients diagnosed with diabetes mellitus and present at the endocrinology clinic of the hospital. The study included patients diagnosed with diabetes mellitus that had never developed foot ulcer while the study exempted the study exempted individual diagnosed of diabetes mellitus who already have foot ulcer. Total enumeration was adopted for the study, where patients diagnosed with



diabetes mellitus that have not developed foot ulcer present at the endocrinology clinic were recruited on clinic day for two weeks.

The instruments used for data collection was a self-structured questionnaire to determine pre- and post-intervention self-reported foot care practices. The researcher developed a questionnaire consisting of 24 items and structured around diabetic foot ulcer self-care practice which had the following sections:

Section A: 8 questions on demographic data which include: gender, age, marital status, religion, ethnicity, educational level and duration of diagnosis.

Section B: 16 questions on self-care activities. The grading score was between 1-16, score between 0-5 regarded as low, 6-11 moderate and 12 – 16, regarded as high. The scores were converted to percentages between 1-100%. Practice score of participants below 50% was categorized as low Practice level, Practice score of participants between 50% to 60% was categorized as moderate practice level and practice score of participants of 70% and above was categorized as high practice level.

Content and face validation of the instrument were done by experts in the fields of study for correction. The reliability of the questionnaire was ascertained using internal consistency method. Copies of questionnaire were distributed to 10 diabetes mellitus patients at a facility outside the sampled area. Cronbach Alpha was used to determine the internal consistency which yielded reliability coefficient value of 0.765. The procedure for data collection involved three phases namely pre-intervention phase, intervention phase and post-intervention phase. The intervention program was done individually and later in batches of not more than four participants in a batch on a day agreed upon by the participants. An intensive educational module was used to train the participants on self- foot care practices. Data from participants at the end of the study was analysed using statistical package for social sciences (SPSS), version 21. Research questions answered using descriptive statistics of mean and standard deviation. Inferential statistics of the hypothesis was also tested using t- test at 0.05 level of significance.

## Results

**Table 1: Frequency and percentage showing demographic data of respondents**

		<i>Frequency (N=39)</i>	<i>Percentage (%)</i>
<b>Gender</b>	Female	31	79.5
	Male	8	20.5
<b>Marital Status</b>	Married	21	53.8
	Single	1	2.6
	Divorced	5	12.8
	Widowed	10	25.6
	Separated	2	5.1
<b>Religion</b>	Christianity	27	69.2
	Islam	10	25.6
	Traditional	2	5.1
<b>Age</b> <i>Mean age: 51±9.859</i>	20-24years	1	2.6
	25-29years	1	2.6
	30-34years	1	2.6



	35-39years	3	7.7
	40-44years	4	10.3
	45-49years	2	5.1
	50-54years	-	-
	55 years and above	27	69.2
<b>Ethnicity</b>	Igbo	7	17.9
	Yoruba	29	74.4
	Hausa	2	5.1
	Others	1	2.6
<b>Educational level</b>	Primary school	8	20.5
	Secondary school	15	38.5
	Higher institution	11	28.2
	No-formal Education	5	12.8
<b>Duration of Diagnosis</b>	1-3 years	12	30.8
	4-6 years	6	15.4
	7-9 years	6	15.4
	10 years and above	15	38.5

Table 1 showed that 39 respondents participated in the intervention where majority of the respondents (79.5%) in the intervention study were female. Majority of the respondents (69.2%) were between 55years and above. Moreover, majority of the respondents were Yorubas (74.4%). Majority of the respondents (53%) were married. Majority of the respondents (69.2%) are Christians. Consequently, majority of the respondents (38.5%) were diagnosed between 10 years and above.

**Research Question 1:** What is the pre- intervention level of self-reported practice of foot care regarding prevention of diabetic foot ulcer among patients attending clinic in Lagos State University Teaching Hospital Ikeja?

Table 2 showed response on self-practice pre-intervention. Majority (71.8%) of the respondents agreed that foot inspection can be done weekly; while 28.2% disagreed. Majority (84.6%) of the respondents agreed that it is important to dry in between your toes, while 15.4% disagreed. Majority (97.4%) of the respondents agreed that they use cream on their feet while 2.6% disagreed. Also, majority (76.9%) of respondent agreed that they use medicated foot products while 23.1% disagreed. More than half (61.5%) of respondents agreed that toe nails should be cut very short with the use of a razor blade while 38.5% disagreed. Also, most (82.1%) of respondents agreed that they cut straight across when cutting your toe nails while 17.9% disagreed. Majority (87.2%) of the respondents agreed that it is necessary to inspect shoes before putting them on while 12.8% disagreed. More than half (76.9%) of the respondents agreed that checking of water temperature before bath and washing of feet is important while 23.1% disagreed. Majority (61.5%) of the respondents agreed that they use a hot-water bottle on their feet while 38.5% disagreed. Consequently, majority (66.7%) of the respondents agreed that they sit with their legs crossed while 33.3% disagreed.



**Research Question 2:** What is the post- intervention level of self-reported practice of foot care regarding prevention of diabetic foot ulcer among patients attending out-patient clinic Lagos State University Teaching Hospital?

Meanwhile, Table 2 also showed that response on self-practice post-intervention, majority (97.4%) of the respondents agreed that it is important to dry in between your toes, while 2.6% disagreed. Majority (92.3%) of the respondents agreed that they use cream on their feet while 7.7% disagreed. Moreover, majority (74.4%) of the respondents agreed that they cut straight across when cutting your toe nails while 25.6% disagreed. Majority (87.2%) of the respondents agreed that they inspect their shoes prior to wearing them while 12.8% disagreed. Majority (79.5%) of the respondents agreed that they wear tight socks while 20.5% disagreed. Consequently, majority (87.2%) of the respondents agreed that checking of water temperature before bath and washing of feet is important while 12.8% disagreed.

**Table 2: Pre- and Post- intervention score on practice of Self-care Activities**

Items	Pre-Intervention		Post-Intervention	
	Yes (%)	No (%)	Yes (%)	No (%)
1. Foot inspection can be done weekly	28(71.8)	11(28.2)	11(28.2)	28(71.8)
2. It is important to dry in between your toes	33(84.6)	6(15.4)	38(97.4)	1(2.6)
3. Cream should be applied on the feet	38(97.4)	1(2.6)	36(92.3)	3(7.7)
4. It is best to cream in between your toes	29(74.4)	10(25.6)	11(28.2)	28(71.8)
5. Medicated foot products should always be applied on the feet	30(76.9)	9(23.1)	12(30.8)	27(69.2)
6. Toe nails should be cut very short with the use of a razor blade	24(61.5)	15(38.5)	8(20.5)	31(79.5)
7. When cutting your toe nails, you should cut straight across	32(82.1)	7(17.9)	29(74.4)	10(25.6)
8. It is not important to wear shoes without socks.	22(56.4)	17(43.6)	9(23.1)	30(76.9)
9. You should regularly walk barefoot in your living room and surroundings	17(43.6)	22(56.4)	7(17.9)	32(82.1)
10. It is necessary to inspect your shoes prior to wearing them	34(87.2)	5(12.8)	34(87.2)	5(12.8)
11. Wearing of tight shoes is not always avoided.	23(59.0)	16(41.0)	13(33.3)	26(66.7)
12. Tight socks should always be worn	19(48.7)	20(51.3)	31(79.5)	8(20.5)
13. Feet should always be soaked	19(48.7)	20(51.3)	5(12.8)	34(87.2)
14. Checking of water temperature before bath and washing of feet is important	30(76.9)	9(23.1)	34(87.2)	5(12.8)
15. Hot-water bottle should be used on the feet when feeling cold	24(61.5)	15(38.5)	6(15.4)	33(84.6)
16. You should always sit with your legs crossed.	26(66.7)	13(33.3)	8(20.5)	31(79.5)





**Table 3: Summary of diabetic foot ulcer patient's practice of self-care activities**

Level of practice of foot ulcer diabetic patients regarding self-management					
	Pre- Intervention Mean: $\bar{X}$ - 11.410		SD	Post- Intervention Mean: $\bar{X}$ -15.692	SD
Scoring range	Level	N (%)	2.112	N (%)	0.655
Above 70%	Good	22(56.4%)		39 (100.0)	
50-70%	Fair	17(43.6%)			
	<b>Total</b>	<b>39 (100.0)</b>		<b>39 (100.0)</b>	

Table 3 shows the level of diabetic foot ulcer patient's practice of self-care activities pre/post-intervention; 22 respondents (56.4%) were good in self-care practice, while 17 respondents (43.6%) were fair in self-care practice pre-intervention. Also, mean score = 29.1 and standard deviation 5.021. Post-intervention, 43.6% respondents increased in self-care practice. While the mean score was 15.692 and standard deviation was 0.655. Therefore, this finding showed an effect in practice of the patient due to the training programme organized by the researcher.

#### Test of Hypothesis

**Ho1:** There is no significant difference in the pre-intervention and post-intervention scores of self-reported foot care practice regarding prevention of diabetic foot ulcer.

**Table 4: Difference in the pre-intervention and post-intervention scores of self-reported foot care practice regarding prevention of diabetic foot ulcer.**

Practice	N	Mean	SD	SME	T	Df	M. DIFF.	P
Pre-intervention	39	11.410	$\pm 2.112$	0.338	33.746	38	4.282	.000
Post-intervention	39	15.692	$\pm 0.655$	0.105				

Table 4 shows a statistically significant effect of the intervention package on the practice score of respondent's post-intervention. The effect is represented by the mean difference of =4.282 with p value 0.000 between the pre-intervention mean score of  $\bar{X}$ =11.410; SD= $\pm 2.112$  and post-intervention  $\bar{X}$ =15.692; SD= $\pm 0.655$ . Thus, there is a significant difference in the effect on the pre-intervention and post-intervention scores of self-reported foot care practice regarding prevention of diabetic foot ulcer. Hence, the hypothesis is rejected.

#### Discussion

Majority of the respondents in the intervention study were female. This shows that diabetic foot ulcer is dominance among female in this study. Majority of the respondents were between 55years and above. This distribution may be that older adults were present during data collection and diabetic foot ulcer occurs in older adults. Moreover, majority of the respondents were Yorubas. This distribution may be due to the dominance of Yoruba tribe in

Lagos and they were present during the time of data collection. Majority of the respondents were married. This distribution may be because married people were present during data collection. Majority of the respondents are Christians. This distribution may be due to the Christians been present at time of data collection. Consequently, majority of the respondents were diagnosed between 10 years and above. This distribution showed that those respondents have been managing diabetes mellitus for a long period of time.

The study revealed that majority of the respondents agreed that foot inspection can be done weekly. Majority of the respondents agreed that is it important to dry in between your toes. Majority of the respondents agreed that they use cream on their feet. Also, majority of the respondent agreed that they use medicated foot products. Most of the respondents agreed that toe nails should be cut very short with the use of a razor blade. Also, majority of the respondents agreed that it is not important to wear shoes without socks. Majority of the respondents agreed that they use a hot-water bottle on their feet. Consequently, majority of the respondents agreed that they sit with their legs crossed. Hence, study showed that a good level of practice of diabetic foot ulcer during the pre-intervention. This finding supports the study done by Raithatha, et al (2016) to determine the Self-Care Practices among Diabetic Patients in Anand District of Gujarat who reported that in Physical activity (PA) domain: only forty (40%) participants reported involving in some form of exercise in their leisure time at least 3 days a week. Dietary practices (DP): only 19% of participants reported an intake of at least one serving of raw vegetables or fruits per day. Medication taking (MT): 82% of participants reported that they always took medicines at regular intervals and 68% reported that they had not missed a single dose of medicines in the past one week.

Monitoring of glucose with only 16% participants reported self-monitoring of blood sugar. Foot care (FC): only 9% of participants examined their feet on a routine basis for any damage to the skin. 12% examined the interior of their footwear to look for any thorns or other foreign body. Only 4% of participants were wearing footwear inside the house. Psychosocial adjustment (PsA): 10% of participants were categorized as having depression using the operational definition of PHQ  $\geq 3$ . The MPS for PsA for those having some other chronic illness (4.65) was significantly less ( $P=0.03$ ) than those not having any other chronic illness. Similarly, the study carried out by Rajasekharan, et al (2015) in India on self-care practices, regarding the physical activity component, of the participants 43.4% (126/290) practiced a physical activity of at least 30 min on all days of the week. A separate exercise session apart from their day to day physical activities was carried out by 17.6% (51/290) participants. Most of the study participants 64.8% (188/290) washed their feet daily. Among them 70.7% (133/290) dried between their toes daily after washing. Very few 28.3% (82/290) participants checked their feet on all days of the week. Furthermore, very few 13.4% (39/290) participants examined the inner surface of their shoes for blood or other discharges on all days of the week.

On the responses on self-practice post-intervention, few of the respondents agreed that foot inspection can be done weekly. Majority of the respondents agreed that is it important to dry in between your toes. Majority of the respondents agreed that they use cream on their feet. Moreover, majority of the respondents agreed that it is not important to wear shoes without socks. Majority of the respondents agreed that they wear tight socks. Few



of the respondents agreed that they soak their feet. Majority of the respondents agreed that checking of water temperature before bath and washing of feet is important. This finding is consistent with the study carried out by Dedefo, et al (2019) in Ethiopia on self-care practices regarding self-care practice domains of diabetic patients showed that majority of them 209 (82.9%) had adequate foot care and more than half 175 (69.4%) and 160 (63.5%) had adequate dietary plan and exercise management respectively.

In a study conducted in Iran (2016), it was observed that before the intervention that out of 80 participants, 37.9% inspect their foot daily but there was significant increase (87.9%) post intervention. This is contrast to findings of this study, where majority of the respondents (71.8%) agreed that foot inspection should be done weekly pre-intervention. However, post intervention, only 28.2% agreed that foot inspection should be done weekly. Moreover, the findings of this study revealed that pre-intervention, 87.2% agreed that inspection of shoe is necessary before wearing, pre and post intervention, however, in a study conducted in Iran, 13.8% inspect their shoes before putting them on pre- intervention while 53% of them inspects their shoes post intervention.

Also, in a study carried out in Iran, 60.3% of them walk bare foot before the intervention while 47% walked bare foot after the intervention this is similar to the findings of this study whereby majority of the respondents (43.6%) walked bare foot before the intervention, post intervention, there was drastic improvement in the habit of shoe wearing, lesser percentage (17.9%) of the participants walked bare foot. Additionally, the findings of this study revealed that 84.6% accepted to dry the water in between their toes pre-intervention while 97.4% responded post-intervention. This agrees with the findings of the study done in India, where 17.3% dry the water in between the toes before the intervention while 72.7% dries between toes after intervention.

In a study carried out in India, checking of water temperature before bath was often done by 29.3% of them before intervention while 74.2% of them often check post intervention, this agrees with the findings of this present study in which there was significant increase in the number of respondents that check the temperature of their water post intervention (87.2%). Moreover, in a study carried out in India, 8.6% cut toenail properly before the intervention while 71.2% cut toe nail properly after the intervention. This is similar to the findings of this study. Additionally, it was observed in this present study that majority of the respondents (97.4%) applied cream on their feet both pre and post intervention, this is contrary to the findings of the study carried out in Iran where 13.8% use emollient for dry skin before and 71.2% used emollient post intervention (Kafaie, et al., 2016).

The study showed that there is a significant difference in the self-reported foot care practice regarding prevention of diabetic foot ulcer among patients. The effect is represented by the mean difference of =4.282 with p-value 0.000 between the pre-intervention mean score of  $\bar{X}=11.410$ ;  $SD=\pm 2.112$  and post-intervention  $\bar{X}=15.692$ ;  $SD=\pm 0.655$ . This showed that pre-intervention self-reported foot care practice regarding prevention of diabetic foot ulcer was improved by the training program judging from the increase in post intervention mean practice score when compared with the pre-intervention mean practice score.



The finding of this investigation showed that prior to training, there was no effect in mean practice score regarding self-reported foot care practice among patients attending out-patient clinic in Lagos State University Teaching Hospital Ikeja as judged from pre-intervention mean practice score. Two weeks post-intervention, training program was found to be effective as it reflects an increase in practice of the respondents compared with pre-intervention. This finding supports previous study done by Kotru et al (2015).

### Conclusion

Based on the findings of this study, patients in Lagos State University Teaching Hospital Ikeja did not have adequate self-reported foot care practice regarding the prevention of diabetic foot ulcer before training. Intensive training programme on self-management of foot diabetic ulcer improved the patient's self-reported practice regarding the prevention of foot diabetic ulcer. Intervention training significantly improved patient's self-reported foot care practice regarding the prevention of diabetic foot ulcer.

### Recommendations

- 1 Health care providers should take time to explain in depth on diabetic foot ulcer, causes and prevention/control through health and self-foot care measures to prevent complications.
- 2 Programmes such as exercise and self- foot care monitoring should be organized to equip them to effectively monitor their blood glucose level as well as control their diet accordingly.
- 3 Patients with diabetic foot should not cross their legs for long period of time as it can reduce blood flow to the feet.
- 4 Adequate planning of a therapeutic diet that helps keeps blood sugar level more stable in order to prevent diabetic foot.

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