

**A STUDY ON RISK CATEGORIZATION AND PREVENTION STRATEGIES IN DIABETIC FOOT ULCERS**

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St James Hospital Trust Pharmaceutical Research Centre, Chalakduy, Kerala**\*Corresponding author e-mail: [stjamesdruginfo@gmail.com](mailto:stjamesdruginfo@gmail.com)****ABSTRACT**

The objective of this study was to assess the risk factors of poor diabetic foot care and to find the effectiveness of health education in improving foot care practice among diabetic patients. It was a one group pre test, post test pre experimental study. About 100 patients were included in the study. Patients were enquired about their foot care practices. A structured pre-tested questionnaire was administered to the outpatients of a rural health center with type 2 diabetes. Awareness regarding diabetes, care of diabetes and foot care practice were assessed and scored. Individual and group health education focusing on foot care was performed. Foot care practice was reassessed when the patients came for review. Mean age of included patients was 58.5 years. Only 80% were aware about foot care, majority of the patients did not learning session about foot care. 58 out of 100 were having one or the other factors responsible for them to be categorized as high risk feet. Low education status, old age and low awareness regarding diabetes were the risk factors for poor practice of foot care. The average score for the level of practice had a 65% increase after the education when comparing pre test and post test score. It was also found that proper foot care practice was related with foot care education. Foot care education for diabetics in a primary care setting improves their foot care practice and is likely to be effective in reducing the burden of diabetic foot ulcer.

**Keywords:** Diabetic, Foot ulcer, Education**INTRODUCTION**

Diabetes is now one of the most common devastating metabolic disorders which are mainly prevalent in the developing world and it is keeping on increasing alarmingly. According to the current status India leads the world with an estimation of 61.3 million people with diabetes second to China; which is expected to increase by 100 million and globally the number of people affected will be 550 million by 2030 which is mainly due to lifestyle habits. Out of various longstanding complications Diabetic foot is one of the most devastating chronic complications. It is considered as the "Cinderella" complication of diabetics. About 60-70% of diabetic patients will develop lower extremity disease, foot ulcer being the most common.<sup>1,2</sup> Although evidence based data are not available, it is roughly estimated that in India approximately 45,000 LEA takes place every year, and the numbers are increasing each year.. This high

prevalence is attributed to several social and cultural practices such as barefoot walking, lack of diabetes care and awareness, ignorance both by the patients as well as the health care providers, illiteracy, occupational pattern, poor socioeconomic conditions, and the usage of inappropriate footwear.<sup>3,4</sup> DFUs are complex, chronic infectious wounds, which is often aggravated by other complications of diabetes. Individuals who develop a DFU and those cases which lead to amputation, the five year moratlity rate is 68% which is only second to mortality caused by various cancers. This condition makes it mandatory for the development of health care strategies for the diabetic foot care.<sup>3</sup> Evidence based studies suggest that 80% of these amputations are preventable. Keeping the crucial elements such as blood pressure, cholesterol level and Hb count under control helps reducing risk for developing the deteriorating complication.<sup>4</sup> Regular foot examination and early

treatment are the most effective mechanisms to prevent the devastating diabetic foot complications. Best treatment is prevention which requires the identification of the etiological factor responsible for diabetic foot, risk assessment of the foot, and the education of the patient, family and the health care providers. In this context the prevention of LEA through education is in great demand for exploration.<sup>5,6</sup> As a health care provider, the patients should be made aware about the self care management on prevention of deteriorating complications. Thus the objective of this study is to assess the risk and the effectiveness of teaching programme to increase the foot care habits among the diabetic patients as a short term impact, and to reduce the LEA as a long term impact.

## METHODS

The study included 100 patients diagnosed with various complications of diabetes \ undergoing treatment in selected hospital at Chalakudy. Quantitative approach was used as the research method. The study design followed was one group, pre test, post test, pre experimental study design. Non probability convenience sampling technique is used in the study middle age (35 and above) population of both genders who are diagnosed with diabetes, available for the follow up study are included. Those patients who can't understand English or Malayalam, below the age of 35 and those who don't come for the follow up are excluded from the study. A checklist for assessing foot care habits and a structured questioner will be utilized to collect the data on knowledge and practice on prevention of foot ulcers among diabetic patients. A check list will be used to assess the pre test score of the patients regarding their foot care habits and will be scored accordingly. In addition, the socio demographic details will also be noted down. The structured questionnaire consisted of four sections pertaining to awareness regarding diabetes, practice of diabetes care, practice of self-care of feet and feet examination details. The questionnaire in this study was reproduced from NDEP. The data collection was done in local language. Finally, the patients were classified as having high-risk feet based on one of the five following criteria of the National Diabetes Education Program: Lack of protective sensation (sensory neuropathy), absent pedal pulses, foot deformity, current or past foot ulcer and history of foot amputation. Face to face structured education programme was then given to the clients following the questionnaire. This included advice for diet, exercise and regular medication and blood glucose checking. An 11-point education specific to diabetic foot care was also given. The total time allotted for

the individual education session was 5-6 min. Demonstration regarding foot cleaning, drying and foot examination was also done. Patient leaflet was also provided both in English and local language, it was strictly according to the guidelines of NDEP. When the clients arrived for the review their post test score was analyzed using the same checklist provide before, to assess their foot care habits. Post test score was compared with pre test score and the significance was analyzed using paired 't' test, thus the effectiveness of teaching programme was documented. Chi-square' will be done to determine the association between mean pretest knowledge score and demographic variables of the subjects. Descriptive analysis was used for demographic variables.

## RESULTS

Highest percentage (62%) of the samples was in the age group of 51-70 years; mean age was found to be 58.5 Majority (60%) of the diabetic patients participated in the study were males. Educational status of the patients revealed that most (58%) of them had only primary level education. Highest percentage (32%) accounted for labourer followed by farmers (28%). While 22 % of the study category was not working or got retired at the time of study. Only 10% of the sample populations were professionals and the least percentage (8%) was found with drivers. Rural population (75%) was more in number when compared with the urban population The survey conducted among the patients who revealed that only very few (9%) had knowledge on foot care. Majority (91%) showed poor demonstration ability while 9% of the study sample showed below average performance .Almost all the patients had a poor overall knowledge (80%) regarding foot care.

When looking into diabetic complications neuropathy ranked first with a lead of 30% followed by PVD (29%). The share of nephropathy was no less which was about 22%. While the frequency percentage of retinopathy, amputation and CVD was more or less the same High risk behavior was found in 58% of the sample population, while the remaining was found to have low risk behavior (42%). Foot ulceration (32%) was the major risk factor found out which was followed by foot deformity (13%). Those who underwent amputation were 5%. The sample population (6%) had impaired pedal pulse while 3% was presented with loss of sensation in the feet. Many (94%) of them didn't have to face the most devastating complication of the diabetes. The one of the patient had amputation at some level. 3% of the sample had their great toe amputated while 2% of the sample had their other toe to get amputated. The study

showed that only 20% of the sample populations were wearing appropriate foot wear while the remaining 80% required recommendations for wearing shoes or chappals that cause less stress to their feet. In order to find out the association between pre-test knowledge score and selected demographic variables cross tabulations were carried out which revealed that greater chance of getting diabetes foot complications with more risk was seen in the age group of 51-70. While the risk behavior was reduced in the age groups between 35-50 and not seen with the patients having 71 years or older. The nature of occupation was related to the awareness of foot care. Majority of the sample was labourers (32) and most of them had very poor level of awareness. This was followed by farmers among which at least 7 had below average awareness out of 28 farmers. Only one out of 8 drivers was aware about foot care. When looking into the retired group of the sample most (19)

of them were not aware. Only 2 out of 22 retired groups had an average score. Low educational status showed poor level of foot care awareness. The residential nature had a great impact on the foot care awareness. Majority of the sample were residing in rural areas and had a very poor score for awareness (59). In all the age groups almost everyone showed very poor demonstration ability.

The data presented in Table 1 showed that there was a significant association of practice scores with age ( $\chi^2 = 12.115$ ), literacy ( $\chi^2 = 19.343$ ), residence ( $\chi^2 = 13.165$ ) and occupation ( $\chi^2 = 16.978$ ). Thus the null hypothesis was rejected for age, literacy, residence and occupation. However there were no significant association with sex and marital status, monthly. Thus the null hypothesis was accepted for the same.

**Table 1: association of practice score with selected demographic variables**

Sl.No	Demographic variables	$\chi^2$	df	Table value 'p'	Inference
1.	Age in years	12.115	2	5.991	S*
2.	Sex	0.14	1	3.841	NS
3.	Literacy	19.343	2	5.991	S*
4.	Residence	13.165	1	3.841	S*
5.	Marital status	5.152	3	7.815	NS
6.	Occupation	16.978	4	9.488	S*

Tabulated value of  $\chi^2$  at 5risk% level      S\* = Significant      NS = Not significant

The data in the Table 2 indicated that the post- test knowledge score was in the range of 44 - 92 with a mean of 68.63 and SD =11.21 which was higher than

the pre-test knowledge score range (77 - 92) with a mean of 86.52 and SD=3.07.

**Table 2: Comparison of pre-test and post-test knowledge scores**

1. KNOWLEDGE DESCRIPTION

	Obtained range	Mean	Median	Standard deviation	Mean %
Pre-test	77-92	86.52	87	3.07	87
Post-test	44-92	68.63	68	11.21	68

Data presented in Table 3 showed that in the pre-test all of the samples had poor knowledge on prevention of DFU where as in post-test 65% of samples had

average knowledge and 35% of the samples had poor knowledge on prevention of DFU.

**Table 3: Pre-Test and Post-Test Level of Practice**

Level of practice	Range	Pre-test		Post-test	
		f	%	f	%
Good	1-40	-	-	-	-
Average	41-70	-	-	65	65
Poor	71-100	100	100	35	35

To find the significant difference between the mean pre-test and post-test knowledge score, paired 't' test was used. In order to test the statistical significance between the mean pre-test and post-test score, the following null hypothesis was formulated:  $H_{01}$ -The mean post-test knowledge score of construction workers will not be significantly higher than that of their mean pre- test knowledge scores at 0.05 level.

The data in the Table 4 showed that the mean post-test knowledge score (86.52) was higher than the pre-test knowledge score (68.63). The calculated 't' 15.514\* was greater than the table value ( $t_{39}=1.660$ ) at 0.05 level of significance. Hence the null hypothesis  $H_{01}$  was rejected and the research hypothesis was accepted.

Table 4: Effectiveness of Planned Teaching Programme on Prevention of DFU

Parameter	Mean	Standard deviation	Mean difference	't' value
Pre-test	68.63	3.09	17.89	15.514*
Post-test	86.52	11.21		

$t_{99}=1.660, p<0.05; *$ Significant

## DISCUSSION

The frequency of diabetic patients taking proper foot care was suboptimal in this study. However, almost all the patients had a poor overall knowledge regarding diabetes before the teaching programme. In the present study, the results were even more alarming and percentages of high risk behaviours were worrisome. Out of all the factors assessed in diabetic care, foot examination was found to be the least satisfactory. Regular blood glucose monitoring and compliance to diet and life-style advice were found to be comparatively better. This is in line with an earlier finding that foot care and health education were least suggested by doctors. This shows a need to bring foot examination in diabetic care at primary care level by training the health workers and doctors. The finding that patients with low educational status had poor awareness regarding diabetes has also been found in earlier studies done in Iran and Pakistan.<sup>7,8</sup> Also association between low educational status as well as low diabetes awareness level was found with poor practice of diabetic foot care, similar to another Pakistan study. This suggests that education determines knowledge, awareness as well as practice of diabetic patients.<sup>9,10</sup>

Barefoot walking was surprisingly found much higher in this study, which is probably due to ritual activities and because they are unaware about the complications. However, footwear use was heavily skewed in favor of slippers (chappals) rather than sandals with strap, fl oaters or shoes which provide better support to the feet.<sup>11,12</sup> No use of shoes was expected due to cultural reasons and a hot and humid climate. However, reduced use of therapeutic footwear reveals that there is deficiency in care by the health-care providers.<sup>13</sup> A study done in UK

showed that though therapeutic foot wear were provided free of cost, only 22 patients regularly used them. This study emphasizes the need of provision of foot care education. It showed that only 38% patients with diabetes were taught about foot care methods. They remained ignorant about the importance and methods of foot care even after hospitalization for foot infections. Out of 16% patients who were admitted due to foot infection, only 8% received foot care education in hospital. The association of foot care education with better foot care practices has been emphasized earlier. De Bernard demonstrated that patients who received foot care education and had foot examination by doctors were significantly more likely to check their feet regularly. In another study multiple educational approaches were used to teach diabetic patients about foot examination, foot washing and proper foot wear. It was found that an intensive education programme improved the foot care knowledge and behavior of high risk patients.<sup>14,15</sup> Overall, the deficiency in foot care practice of patients was similar to that of the Nigerian and Pakistani studies where one-third to half of the patients were found to have poor foot care practice. Socioeconomic and literacy status play an important role in proper foot care practice, our study succeeded to establish correlation between them which indicates that we need modifications at all levels. However, there is insufficient evidence of the role of patient education in reducing outcomes such as ulcer and amputation incidence. Outdoor footwear use didn't improve as it was already high, whereas indoor footwear use didn't improve probably due to cultural reasons. Also there was no improvement in healthy nail trimming probably because a single education session was not sufficient to introduce this habit. Thus, diabetic foot care education should be regularly

reinforced at outpatient clinic visits to be effective in the long run.

### CONCLUSION

This study found that patient education improved their foot care practice. When consistently reinforced with sustainable patient education at primary care level will be the most cost-effective way of reducing the burden of its complications. Special emphasis should be given to therapeutic foot wear, as it is evident that their physicians are not educating the clients. Specialized podiatric care service centers

must be started with urgent need. Allocation of resources and training of health providers to ensure regular foot examination and foot education must be a priority of any strategy to control diabetes.

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