

# Diabetic Foot Care: Awareness and Practices among Diabetic Patient and Role of Preventive Education for Foot Ulceration in Developing Country, "SAVE FEET SAVE LIVES"

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## ABSTRACT

**Background:** foot ulcers are among the most complication in Diabetic patients worldwide. At the same time, regular care and timely evaluation of the foot ulcer or abrasion may lead to the prevention and reduction in the number of Diabetic foot diseases. Rising prevalence of diabetes mellitus can be associated with higher incidence of diabetic foot diseases. For this reason, diabetic patients are required to routinely practice the self-care of foot.

**Method:** A cross-sectional study was conducted in the public sector hospital of Karachi, Sindh, including 258 patients diagnosed with Diabetes Mellitus. Knowledge and Foot care practice in Diabetic patients were assessed by a questionnaire filling. Then after patients under the study were given one hour education session regarding diabetic foot care. In the one year follow up duration, the incidence of Diabetic foot disease was assessed in these patients.

**Results:** The mean age of patients with DM was 36 years. With respect to grading of knowledge, 24.8% had good, 35.65% had satisfactory and 39.53% had poor knowledge of foot care. The grading of practice of foot care was revealed as 14.23% had good, 46.89% had satisfactory and 36.82% had poor practices of foot care.

**Conclusion:** lack of good knowledge and practice of foot care in diabetic patients revealed in our study and this study demonstrated the potential role of educating the patients with incidence and outcomes of the diabetic foot ulcers.

**Keywords:** Foot care, diabetic foot, knowledge, awareness, practice, education.

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## INTRODUCTION

Diabetes Mellitus is among the most common metabolic disorder which affect multiple organs and body systems. As per World Health Organization (WHO), about 171 million people were reported with Diabetes Mellitus in 2000 and a rise to about 380 million people is predicted in 2025<sup>1</sup>. Recent data of WHO revealed about 422 million people with Diabetes in 2014 with prevalence rate more increasing in countries with low and middle

socioeconomic status<sup>2</sup>. These figures are reflection of diabetes as raising as an epidemic disorder in most of the countries of world. About 1.5 million deaths due to diabetes are being reported in 2019<sup>2</sup>, putting serious impact on the global development as the disorder may lead to the social and economic loss. Additionally, this bring a great challenge for the health care providers as the diabetes is associated with its comorbidities like kidney disorders, retinopathy, neuropathy, and cardiovascular disease<sup>3</sup>. Such conditions are creating a burden on the health

system and requires a specific strategy involving multidisciplinary approach.

Amongst the multiple complication of Diabetes Mellitus, Diabetic foot is a devastating condition affecting around 15% of cases<sup>4</sup>. Diabetic foot is defined as foot infections and ulcers secondary to vasculopathy and neuropathy of the lower limb in DM patients<sup>5</sup>. For a person with Diabetes, there are about 25% chances of developing foot ulcers which increases with advancing age and duration of disease<sup>6</sup>. Diabetic foot is considered as economic burden as it is associated with prolong hospitalization and may lead to amputation of foot<sup>7</sup>. This in turn drastically affects quality of life as a result of permanent disability. The rate of limb amputation in diabetics is about 10-30 times more than non-diabetics<sup>8,9</sup>. Studies have shown that diabetics undergoing amputation carry 50% risk of re-amputation<sup>10</sup> with mortality rate of 30% within one year which may go as high as 50% in three years post-amputation<sup>11</sup>.

Diabetic foot with its complications is evolving as a major health care problem in the developing countries. Being the 7<sup>th</sup> largest country of diabetic patients, Pakistan is facing a huge burden of diabetes and its complications. It has been also estimated that by 2030 the country will be the 4<sup>th</sup> largest country of diabetic patients as by 2015 the number of diabetic patients reached to 12.9 million<sup>12</sup>. Considering one of the developing country, Pakistan is facing the socioeconomic growth challenges, limited health resources and inappropriate health care education facilities. Under such circumstances the diabetes is evolving as a major health care issue as management of this disease is a financial burden. Globally, the cost of this disease will reach to \$2.5 trillion by 2030<sup>13</sup>. In the same time, treatment of Diabetic foot lesions is putting additional burden on the health care system as the individual cost of treating foot ulcers was from 7000-10000\$ which may increase to 65000\$ when it lead to amputation<sup>14</sup>.

Diabetes itself and its complication like peripheral vascular disease and neuropathy are the major factors for the development of foot ulcers. Adding to these, foot trauma, poor vision, limited mobility of joints, mechanical pressure, improper footwear, and cleaning can also enhance the chances of deteriorating diabetic foot ulcers<sup>15,16</sup>. Surprisingly, the early detection, proper treatment of foot care and hygiene can arrest 85% of the diabetic foot ulcers for progression to amputation stage<sup>17</sup>. Giving awareness and knowledge of all these can be very helpful in preventing Diabetic foot amputations<sup>18</sup>. The

aim of study is to assess knowledge and practice of foot care and to determine the role of foot care education for preventing development of foot ulcers among the diabetic patients in developing countries.

## MATERIAL AND METHODS

A descriptive cross-sectional study was conducted on the 258 people with known Diabetes Mellitus (type I and Type II). The inclusion criteria were: male and female with age more than 18 years, known diabetes (Type I or II) who have not/never developed foot ulcers before were included in the study. The exclusion criteria were pregnant patients, severely ill patients with diabetes, patients receiving medications for any other disease or having psychological disorders. Informed consent was taken before patient enrollment. The major outcome measures of the study were knowledge and practice regarding foot care in diabetics.

A pretested questionnaire was used to assess the knowledge and practice regarding foot care. Initially about 18 questions were asked where each correct answer was given 1 marks. The grading was given as good, satisfactory and poor knowledge. Score more than 70% denotes good, between 50-70% indicated satisfactory and below 50% indicates poor regarding knowledge and practice of foot care. This was followed by another one-hour education session in which knowledge was given regarding foot care in diabetics (Table 1) with possible major consequences like recurrent infections, ulcerations, hospitalizations and amputation. Then the participants were followed up for the next one year.

The collected data was analyzed using statistical software SPSS version 20. The descriptive statistics were taken. Frequencies and percentages were taken for the categorical variables while mean and standard deviation were used for the continuous variable. A chi-square test was applied for the assessment of possible difference for patient's prior knowledge of foot care with occurrence of ulcers or other consequences. The results were compared using student t-test. In all cases the p-value of  $\leq 0.05$  was considered as statistically significant.

## RESULTS

In 258 participants of the study, mean age  $\pm$  standard deviation was  $36 \pm 15.6$  years. The age group distribution is summarized in Table 2. Considering gender distribution, 152(58.91%) were female and 106(41.08%) were male. The education level was categorized as secondary or high school graduates,

primary school graduates and those who were unable to read and write. Among them 59 (22.86%) were secondary or high school graduates, 148 (57.36%) were primary school graduates and 51 (19.6%) were unable to read and write. With respect to their occupational status 121(46.89%) were female housewives, 55(21.31%) were manual labors, 47(18.21%) were office workers and 35(13.56%) were either students or unemployed.

Among the study participants, 66 (25.58%) were suffering from type I and 192 (74.41%) from type II Diabetes mellitus. 171 (66.27%) were having positive family history of diabetes while 87 (33.72%) were not having any family history of diabetes. The duration of diabetes with distribution in groups has been mentioned in table 2. 172 (66.66%) were taking the medicines regularly while 60 (23.25%) were irregularly taking medicines. 26 (10.07%) of the participants were not taking any kind of medicine for diabetes. 181 (70.15%) participants were having knowledge of importance of keeping blood glucose level at normal levels while 77 (29.84%) of participants were having no knowledge about it.

Among the study population, gender has no significant correlation with the knowledge and practice of foot care in diabetes ( $p=0.25$ ). While the education of the study population showed significant association with the knowledge and practice of foot care in diabetes ( $p=0.0001$ ). Regarding the assessment of knowledge of foot care in diabetics, 64 (24.8%) respondents had good knowledge, 92(35.65%) had satisfactory knowledge and 102(39.53%) had poor knowledge about foot care. Whereas only 41(14.23%) respondents had good practices for foot care, 121(46.89%) had satisfactory practices and 95(36.82%) had poor practices.

During one-year follow-up of diabetic patients under the study who also attended the diabetic care education session, the mean diameter of callosities of calcaneal and other regions decreased to half of their size, and a significant decrease was observed in the number of callus in other regions than the calcaneal region ( $P < 0.005$ ).

The results showed Patients' foot care knowledge was improved and incidence of foot ulceration and amputations were reduced with risk ratio (RR) 0.29, (95% confidence interval (CI) 0.11 to 0.64) and RR 0.28, (95% CI 0.17 to 0.73) respectively.

## DISCUSSION

The devastating and miserable complications faced by diabetics include foot ulcers and amputation which

can lead to disability and death if not looked after properly and on time. Knowledge and practice in taking proper, timely and good care of foot in diabetics may prevent such complications<sup>19</sup>. The study conducted primarily assessed the knowledge and practice of foot care in diabetics and also analyzed the outcome of educating the diabetic patients regarding foot care and foot ulcers in developing country like Pakistan.

The study population have the age range from 18-86 with mean age of  $36 \pm 15.6$  years. It was found that the major portion of the study comprised of the age group between 41 to 70 years old people. (Table 2.) Almost similar findings were observed in National Diabetes Statistics Report in 2015 elaborating the main age group presented with diabetes comprised of adults between the age of 45 to 64 years<sup>20</sup>. Number of female patients were slightly more as compared to male. In the study about 66.27% people were reported with a positive family history of diabetes. This observation was comparable to the studies which showed association of diabetes among those who are having the diabetes in their family history<sup>21</sup>. Furthermore, in this study prevalence of type II diabetes was found more than type I diabetes (Table 3) which was earlier elaborated in the study<sup>2,3,21</sup> showing higher incidence of type 2 diabetes as compared to type 1<sup>2,3</sup>. Moreover, 66.27% of the participants had history of diabetes in their families whereas 33.72% of participants were not presenting any family history of diabetes (Table 3).

With respect to the knowledge of foot care in diabetics, 24.8% of the participants were found to have good knowledge. While the study done had results not comparable to the study conducted in Northeast Ethiopia which showed about 61.3% of the diabetics with good knowledge for taking self-care of foot<sup>22</sup>. Another study of Li et. al. showed about 70.90% of patients had knowledge of regular self-care of foot<sup>23</sup>. However, another study conducted in Guilan Province (north of Iran), the finding was consistent with our study in which about 15.2% of the participants had good knowledge of foot care<sup>24</sup>. The variations in the knowledge level in different studies could be due to literacy and advancement of technologies at different area. In our study about 57.36% of the participants were having only the primary education. This finding is indicating that the lower level of education can be one of the contributory factor in the lower ratio of people with good knowledge of taking self-care of foot. The participants with the satisfactory knowledge were

35.65%. These figures of good and satisfactory knowledge of foot care revealed that educating the diabetic patients regarding proper foot care has improved their knowledge of understanding the importance of taking the foot self-care. In the study about 19.6% participants were not having even primary level of education and the number of participants who were having poor knowledge of foot self-care is 39.5%. This can be compared with the study of India in which a positive association was revealed in between the lower level of education with the poor knowledge score of participants. Another study from South Africa also showed a significant association of the level of education and those who were less than 65 years old with good score of foot care knowledge<sup>25</sup>. Another study from the Italy also showed association of the foot ulcers and complications with smoking and lower level of education<sup>22</sup>.

In this study, 14.23% of respondents had good practices, 46.89% of the respondents had satisfactory practices and 36.82% had poor practices of foot care. Likewise, in terms of knowledge of foot care, our results are not similar to the previous studies of practices of foot care of diabetics. Tuha A et al. showed about 39% of diabetic patients were having good practice of foot care<sup>22</sup>. Another study conducted in Northwest Ethiopia showed that about 56.2% of the diabetic patients had good practice of foot self-care<sup>26</sup>. These higher values of practice may reflect there counselling and health education of foot care at the time of visit to the physician. However, our findings were consistent to some extent with the study conducted in 2018 by Karadağ FY et al. which showed 20.8% of patients had good foot care practice, 49.6% had moderate and 29.5% had poor foot care practice<sup>27</sup>.

From the above finding this can be suggested that there is a big gap is present in awareness of the diabetic complications and its worst outcomes. This can be overcome by educating the patients at very early stage or at the time of onset of the disease. Here the role of health care providers can be very beneficial in reducing the complication of diabetic foot ulcers, by providing the basic information regarding foot care and the outcomes of diabetic foot ulcers. This can be demonstrated by a study where about 50% of the participants revealed lack of foot examination during their visit to doctor and about 28% of the patients were unaware of the foot care education<sup>28</sup>. In another study similar findings were observed in which 90% of the participants had never received Diabetic foot disease education and 22.2%

of the participants had their foot examination only when they had a problem<sup>25</sup>. However, in this study, number of participants who scored satisfactory practice (46.89%) was more than the number of participants with satisfactory knowledge (35.65%). This finding can be related to the religious habits of the Muslims as the study has been conducted in Pakistan and majority of the people living there belong to Muslim culture who do the practice of ablution 5 times a day. This finding is also consistent with the study conducted by Hasnain S, Sheikh NH. in which the difference of foot care practice with knowledge was different showing about 54% of the participants were having satisfactory practice while 40% had satisfactory knowledge<sup>29</sup>.

In the current study, 36.82% of the patients with diabetes mellitus had poor practice of foot care which is an alarming situation as it may cause formation of foot ulcers, its complication and may lead to the amputation. This figure should be carefully monitored by the health care system and providers of state or country. As the preventive measures are very effective in term of cost as well as disease management. The worldwide incidence of diabetes mellitus is increasing so the incidence of its complications are also increasing. Diabetic foot ulcers, infections, gangrene and amputation are amongst the main complication of the diabetes mellitus. In such circumstances patient education can play a very effective role in timely seeking medical treatment if any ulceration is noticed. Proper self-care of foot can prevent serious consequences of diabetic foot disease. For this physicians should provide awareness of foot ulcers and its complications to diabetic patients. It is also duty of the health care system to plan and design the education sessions of foot care awareness for the diabetic patients. The education session and awareness programs can be incorporated with the use of electronic and social media which can be very beneficial. Along with this health care system should train the nurses and other health care providers for educating and providing awareness of foot care to diabetic patients. Special training and education of nurses and health care providers on the foot care have proved as an important key for prevention of diabetic foot ulcers<sup>30</sup>.

## CONCLUSIONS

The aim of study was to assess the knowledge, attitude and practice of the foot care among the diabetic patients so that proper planning can be designed for the prevention and management of

Diabetic foot diseases and ulcers. In this study, more than one third of the participants were having poor knowledge and poor practice of the diabetic foot care. Unfortunately, only 14% of the participants were having good practice of self-foot care. These results can lead to the poor outcome of the diabetic foot disease and emphasizes the need for the development of foot care education system. This education should be provided at the hospital as well as community level so that everyone should be aware of disease and its complication and its worst outcomes.

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