Research Article

Study the foot care practice among diabetic patients in Ahmedabad city, Gujarat

Lakshmi N, Nirav Patel, Pravin Parmar, Ketan Garasiya, Milan Chaudhary

Department of Community, Medicine B J Medical College, Ahmedabad, Gujarat, India

Correspondence to: Nirav Patel, E-mail: drniravpatel111@gmail.com

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ABSTRACT

Background: Diabetes mellitus is a multifaceted disease and foot ulceration is one of its most common complications. Poor foot care practices are important risk factors for foot problems among people with diabetes. **Objectives:** The objectives of this study were to know the magnitude of the foot ulcer and to assess the level of foot care practice among diabetic patients in Ahmedabad city. **Settings and Design:** The community-based cross-sectional study was conducted in 150 consecutive diabetes patients found in the field practice area of BJ Medical College, Ahmedabad. **Materials and Methods:** A pre-tested semi-structured questionnaire was used for data collection. Diabetic neuropathy is checked using 10 g monofilament test. Statistical analysis was done by Microsoft Excel 2012, Epi Info version 7.2 and Z-test of proportion. The *P* level of <0.05 was considered statistically significant. **Results:** Among 150 study participants, only 16.6% (25) patients follows good foot care practice with American Diabetes Association foot care practice score of >70%. Age <60 years ($z = 3.03$, $P < 0.05$), educational status >5th standard ($z = 3.08$, $P < 0.05$) were significantly associated with good foot care practice. 11.3% ($n = 17$) had foot ulcer. Poor glycemic control ($z = 3.099$, $P < 0.05$) and loss of touch sensation ($z = 8.004$, $P < 0.05$) were significantly associated with the development of foot ulcer. The prevalence of peripheral neuropathy was 18% ($n = 27$). **Conclusion:** There were poor foot care practices among diabetic patients. Majority of them were wearing improper foot wear. Poor glycemic control and loss of touch sensation were associated with the development of foot ulcer.

KEY WORDS: Diabetes; Foot Care; Foot Ulcer; Peripheral Neuropathy

INTRODUCTION

Diabetes is a chronic disorder that occurs either when the body cannot effectively use the insulin it produces or when the pancreas does not produce enough insulin. Globally, the number of people with diabetes has increased from 108 to 422 million from 1980 to 2014. Prevalence of diabetes among adults has escalated to 8.5% in 2014. The WHO proposed that diabetes will be the seventh leading cause of mortality in 2030.[1] Over 1 million lower limbs are lost due to diabetes globally every year. In 2008, an estimated 347 million people in the world had diabetes and the prevalence is growing, particularly in low- and middle-income countries. India had 69.2 million people living with diabetes as per the 2015 data. India is also called "The Diabetes capital" of the world.[2]

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It has become major health and socioeconomic burden to family and healthcare system. Interventions that are both cost-effective and feasible in developing countries include lifestyle changes such as exercise low sugar and low saturated fat diet, avoidance of tobacco.[1-3] In 2015, almost 1.6 million mortality was directly related with diabetes. Another 2.2 million deaths were due to high blood glucose.[3] Mechanical stresses from poorly fitted shoes attributes to corns and calluses. Practice of keeping the foot wet for long time predispose to fungal infection. Less education was related with less knowledge about foot care.[4] Out of pocket expenditure for the treatment

of NCD has increased drastically in people belonging to lower socioeconomical class spend recently. In 2008, GDP on health care was 4.2% in India.[5] The prevalence of diabetic foot ulcer was 8–17%. Foot ulcers can attribute to lifelong disability, repeated hospitalization, and remarkable financial burden to health systems as well as families.[6] The further complication is infection which contributes to half of the diabetic foot ulcers.[7,8] Around 25–50% of all hospitalization in diabetic patients are due to foot problems. More than three fourth of diabetes-related amputations are preceded by foot ulcers, and it accounts for more than half of non-traumatic lower limb amputations.[7,9] Diabetic patients with foot ulcer also face troubles in their health-related quality of life.[10,11]

Around 49–85% diabetic foot-related problems are preventable if timely adequate measures are taken. This can be achieved by health education for both diabetic patients and healthcare personal.[12] Patients with diabetes have remarkably higher risk of developing diabetic foot that can only be prevented by building awareness regarding self-care. The chance of developing chronic non-healing foot ulcer in diabetics is approximately 15% in their lifetime. To emphasize the significance of diabetic foot problems, International Diabetes Federation also came up with the theme of World Diabetes Day in 2005 "Put Feet First, Prevent Amputations.[13]"

The objective of the current study was to assess the foot care practice and to estimate the proportion of people with foot ulcer complication and proportion of people with peripheral neuropathy (PN) among people with diabetes residing in the field practice area of B.J. Medical College, Ahmedabad. By this study, we can assess the foot care practices done by diabetic patients and also the prevalence of foot ulcer complication as well as PN among them. This information will help the policymakers to develop targeted self- management education programs for them.

MATERIALS AND METHODS

A community-based cross-sectional study was undertaken from September to November 2016 in Ahmedabad district of Gujarat state. This study was conducted in the six field practice areas of B.J. Medical College. Prevalence of diabetes is 7.8%[14] with an absolute precision of 5% the minimum representative sample was 115, but we took 150 respondents. The list of people who is having type 2 diabetes mellitus was taken from health workers register and their address has been noted.

To be included in this study, subjects had to be type 2 diabetic patients of at least 1-year duration and willing to participate in the study. Non-probability convenience sampling technique was utilized for this study. Exclusion criteria comprised patients with Charcot foot, congenital foot deformities, foot amputation, and visual impairment. The respondents were interviewed on a pre-tested semi-structured questionnaire after their oral consent. The basic data on sociodemographic profile, habits, and their physical activity were collected from all the subjects. Data regarding disease characteristics and treatment details were taken.

To classify their foot care practice, American Diabetes Association (ADA) guidelines were used. 15 questions were taken from ADA guidelines for foot care practice. Patients following 9 or more than 9 guidelines (more than 70%) were labeled as practicing "proper foot care.[15]" Light touch perception was evaluated using a 10-g Semmes-Weinstein monofilament at four sites of the foot (the plantar and dorsal aspect of 1st and 5th metatarsal heads). The participant should close his/her eyes when being tested and then recognize the perception of the pressure at correct site. Areas of callus were avoided when testing. Loss of perception at any of the four sites was defined as reduced touch perception.[16,17] Study analysis was done using Microsoft Excel 2012, Epi Info version 7.2 and statistical test used was Z-test.

RESULTS

A sample of 150 type 2 diabetic patients (72 males, 78 females) was enrolled as the study population with mean age of 56 (10.1) years and the mean duration of illness 10.6 (5.32) years. In this 26.6% of participants were illiterate; half of the females (45.3%) were housewives [Table 1].

Table 1: Demographic characteristics of the study population (*n*=150)

Characteristics	Frequency *n*=150 (%)
Age (years)	
30–45	22 (14.6)
46–60	85 (56.6)
>60	43 (28.6)
Sex	
Male	72 (48)
Female	78 (52)
Education	
Illiterate	40 (26.6)
Up to 5th std.	57 (38)
6–10th std.	31 (20.6)
11–12th std.	17 (11.3)
Graduate/ postgraduate	5 (0.03)
Occupation	
Job	23 (15.3)
Business	28 (18.6)
Labor	10 (6.7)
Household business	6 (4)
Retired	15 (10)
Housewife	68 (45.3)

Among the study population, 98 (65.3%) were diagnosed to have diabetes at the age of 45 or more and 124 (82.6%) participants were having the disease for more than 5 years. Of the study subjects, 79.3% (119) were on oral hypoglycemic agents (OHAs), 2% (3) on insulin, 1.3% (2) on diet control alone, and the rest 17.3% (26) were on combination of OHAs and insulin. Poor glycemic control (postprandial sugar >180 mg/dl or HbA1C >7.2 mmol) was noticed in almost half (47.3%) of the subjects. Of 150 study subjects, 123 (82%) were regular on treatment with compliance more than 90% over the last month. 11.3% (17) had a history of foot ulcer [Table 2].

Only 16.6% (25) patients follow good foot care practice with ADA foot care practice score of >70%. Details regarding foot care practice number and percentage are shown in Table 3. None of the participants had regular foot examination by doctors. Among 79 participants who had good glycemic control, 3 had foot ulcer, while among 71 who had poor glycemic control, 14 had foot ulcer. Statistically significant correlation was found between poor glycemic control and development of foot ulcer ($z = 3.1$, $P < 0.05$).

A total of 150 diabetic patients, 27 (18%) participants had PN which was diagnosed using 10 g monofilament test. 17 patients who had foot ulcer, among them 15 had loss of sensation. On the contrary, out of remaining 133 patients who were not having foot ulcer, only 12 had loss of sensation and this relation was found to be statistically significant ($z = 8.004$, $P < 0.05$). Table 4 summarizes the relationship of good foot care practice as an outcome variable, with various demographic and social factors. Age <60 years ($z = 3.03$, $P < 0.05$) and education ≥5th std. ($z = 3.08$, $P < 0.05$) shows statistically significant relationship with good foot care practice.

Table 2: Details regarding disease and treatment of the study population (*n*=150)

Characteristics	Frequency *n*=150 (%)
Age at diagnosis	
45 or less	52 (34.6)
More than 45	98 (65.3)
Duration of illness	
<5 years	26 (17.3)
More than 5 years	124 (82.6)
Medication	
Only diet	2 (1.3)
Oral hypoglycemic drugs	119 (79.3)
Insulin	3 (2)
Both (OHD+insulin)	26 (17.3)
Medication regularity	
Regular	82 (54.6)
Irregular	68 (45.3)
Glycemic control	
Good	79 (52.6)
Poor	71 (47.3)
Foot ulcer	
Present	17 (11.3)
Absent	133 (88.6)

Table 3: Salient response regarding foot care practices (*n*=150)

Questions/response	*n* (%)
1. Daily examination of foot	95 (63.3)
2. Washes feet once daily	116 (77.3)
3. Washes feet multiple times a day	34 (22.6)
4. Dried feet properly after every wash	57 (38)
5. Using emollients to their feet	43 (28.6)
6. Walks barefoot outside the house often	7 (4.6)
7. Checked shoes before wearing them	28 (18.6)
8. Cotton socks usage	32 (21.3)
9. Trimmed their toenails properly (straight, leaving the edges)	88 (58.6)
10. Correct fitting low heel leather shoes	14 (9.3)
11. Self-treated their foot for problems such as corns, callosities, and trauma	18 (12)
12. Sit next to heat, fire	-
13. Patients who ever had foot examination by a doctor	43 (28.6)
14. Compliance with antidiabetic medication	123 (82)
15. Tobacco usage	77 (51.3)

*Multiple answers included

DISCUSSION

Foot ulcers are a preventable complication among diabetic patients if they were following proper foot care practices. The important findings of the current study are as follows. Among 150 study participants, only 16.6% (25) patient follows good foot care practice as per ADA guidelines. Age more than 60 years and education <5th standard were significantly associated with poor foot care practices. 11.3% (17) of them had foot ulcer. Poor glycemic control significantly associated with the development of foot ulcer. Vast majority of them uses improper foot wear. 18% of participants have PN.

Mean age of the study population was 56.1 (10.3) years which was 54.45 (6.1) years in study done in Southern India[4] and 54.8 (11.8) in a study done in Puducherry.[18] Various studies were done in different geographical areas of India the mean age of diabetic patient is almost the same. In our study, practice of daily foot inspection was found to be 63.3% which can be well seen in other studies done in southern India[4] and Puducherry,[18] where daily examination of foot was found to be 71% and 47.6%, respectively. Many studies conducted

Table 4: Details regarding foot care practices (*n*=150)

Variables	Good foot care	Poor foot care	*Z*-test
Age			
<60 years	21 (23.3)	69 (76.6)	3.03*
≥60 years	4 (6.6)	56 (93.3)	
Sex			
Male	14 (19.4)	58 (80.6)	0.868
Female	11 (14.1)	67 (85.9)	
Education			
<5th std. (40)	2 (5)	38 (95)	3.08*
≥5th std. (110)	23 (20.9)	87 (79.1)	
Duration of diagnosis			
<5 years	6 (23.1)	20 (76.9)	0.875
≥5 years	19 (15.3)	10.5 (84.7)	
Foot ulcer			
Present	2 (11.7)	15 (88.3)	0.658
Absent	23 (17.3)	110 (82.7)	

*Statistically significant (P<0.05)

worldwide were showing poor foot care knowledge and practices among diabetic patients. The frequency of diabetic patients taking proper foot care was very low (16.6%) in our study. Low education status and old age were the risk factors for poor practice of foot care. Similar association was found in a study done in Pakistan[15] and in Puducherry.[18] This shows there is overall negligence among diabetic patient when it comes to foot care practice. Barefoot walking was surprisingly found much lower (4.6%) in our study as compared to study conducted in Iranian,[19] Nigerian,[20] Saudi,[21] and Indian multicentric studies[22] which wasfound to be 62%, 38%, 18%, and 10%, respectively. This reflects proper knowledge among diabetics in terms of special foot care. In contrast, none were using therapeutic footwear which reflects shortfall of providing health education about foot care by healthcare personal. So far, no study has assessed footwears in primary prevention of ulcers. However, in recent years, it is accepted fact that good footwear prevents foot ulceration.[23] The most common cause in the development of diabetic foot ulceration was PN. Prevalence of PN in patients with diabetes was 18% which was much lower than the prevalence of PN in Tanzania (44%).[24] This difference is due to variations in diagnostic criteria and the heterogeneity of the studies. Prevalence of PN among foot ulcer patient was 88.2%. Special importance should be given to older patients with longer duration of disease as they are more prone to have diabetic complication, like retinopathy, that may lead to increased chance of getting injury. Emphasis should also be given on proper glycemic control measures to avoid lifelong diabetic complication. The study illustrated that the point prevalence of diabetic foot ulcer among diabetics was 11.3%. This finding is in link with the studies done in Tanzania (15.3%)[24] and West Ethiopia (13.6%).[25] However, this finding was lower than the study conducted in Nigeria which found diabetic foot ulcer prevalence to be 41.1%[26] which might be due to different environmental and sociodemographic conditions.

Strength of our study was it's a Community based study and use of a good instrument to screen peripheral neuropathy. Foot care practice was assessed using a scoring system which was validated. Whereas, limitations were time constraint and we did not use any invasive diagnostic procedure to know about exact situation of their health condition. We did not have any monitory funding from any agency.

CONCLUSION

The frequency of diabetic patients taking good foot care practice is very low. It is, therefore, the responsibility of healthcare providers to give health education regarding foot care management, proper footwear usage, periodic foot examination by podiatrist, and avoidance of injury to insensate limb. It is essential to assess patient's beliefs and behavior to choose the most effective way of educational method that helps them to care for their feet efficiently. There is a need for continuous education among doctors to identify the risk factors for foot ulcer in patients with diabetes, also on foot care to improve patient's knowledge of risks and foot self-care practices. Podiatry services and surveillance mechanism should also be strengthened.

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