Awareness and practices of foot self-care in patients with diabetes at Dr Yusuf Dadoo district hospital, Johannesburg

RA Dikeukwu, MBBS, MFamMed, Specialist Family Physician
Department of Family Medicine, University of the Witwatersrand, Johannesburg
OB Omole, MBBS, DA, MCFP(SA), MMed(FamMed), Head
Clinical Unit (Family Medicine), Sedibeng District
Department of Family Medicine, University of the Witwatersrand, Johannesburg
Correspondence to: Olufemi Omole, e-mail: alagbaomole@gmail.com
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Abstract

Objectives: To determine awareness and foot self-care practices in patients with diabetes.

Design: A cross-sectional descriptive study.

Setting and subjects: This study was conducted on 120 consecutive patients with diabetes at the outpatient department of Dr Yusuf Dadoo district hospital, Krugersdorp, Johannesburg. A researcher-administered questionnaire, adapted from the Summary of Diabetic Self-Care Activities, collected information on participants' demographics, clinical co-morbidities, awareness and foot self-care practices. The researcher also conducted a foot examination to identify foot pathologies. Data analysis included descriptive statistics, chi-square and t-tests, and logistic regression.

Outcome measures: Patients' awareness of, and practices pertaining to, foot self-care.

Results: Of the 120 participants, the majority were blacks (59.2%), female (60%) and unemployed (68.3%). The mean age was 56.3 years. Athlete's foot was the most common foot problem that occurred in 16.2% of participants. While only 24.2% reported awareness of foot self-care, 71.7% had performed foot self-care sometimes in the past, and 69.2% had done so at least one day within the last week. Only 5.8% of participants had had their feet examined by a podiatrist, and 32.5% by a doctor or nurse. Approximately 46.7% regularly soaked their feet in water, 7.5% applied talcum powder to dry their feet, 54.2% inspected their shoes and 25% walked barefoot. Smoking was the only variable that was significantly associated with finding a foot ulcer.

Conclusion: Poor participants' awareness and foot self-care practices highlight critical gaps in the care provided to patients with diabetes. Interventions which empower patients and healthcare professionals to regularly perform foot examinations and foot self-care are required to improve diabetic foot care in South Africa.

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Introduction

In 2011, the International Diabetes Federation (IDF) estimated that approximately 366 million people were living with diabetes in the world and that this number would double by 2025, with the vast majority residing in the developing world.[1] According to the South African Demography and Health Survey of 2003, the national prevalence of diabetes was 6.5% among people older than 15 years of age and affected roughly 1.9 million people.[2] In line with the projected global increase, a recent study in Cape Town found a rising prevalence of diabetes of 8-12.2% in urban-dwelling, adult black South Africans between 1990 and 2008/2009.[3]

Diabetic foot problems are the leading cause of diabetes-related hospital admissions and are responsible for approximately 50% of all lower limb amputations.[4] Worldwide, including South Africa, roughly 10-15% of all patients with diabetes will develop foot ulcers at some stage of their lives. In addition, the prevalence of foot ulcers varies from 4-10%, and the annual population-based incidence from 1-4.1%.[4-6] Diabetic foot problems are associated with substantial morbidity, mortality, reduced quality of life and high costs.[7] These costs are mostly unaffordable. Treatment costs are over US$1 200 in some developing countries.[8,9]

Patients with diabetes at greatest risk of foot ulcerations can easily be identified by regular examination of the feet by the patient and/or by his or her healthcare professional (HCP).[10] Prophylactic foot examinations by HCPs have been shown to decrease patient

morbidity, decrease utilisation of expensive resources, and decrease the risk of lower limb amputation and premature death.[11] The risk of diabetic foot complications can be reduced by 49-85% through proper preventative measures, patient education and foot self-care.[10,12] However, a substantial proportion of patients with diabetes are not educated to perform foot self-care, even in the presence of major risk factors for lower limb amputation.[13] This was confirmed by the report by Chandalia et al that noted that while 44.7% of patients with diabetes had received foot care education in the past, only14% had received it at their most recent visit.[14]

Considering that most increases in the prevalence of diabetes occur in developing countries, HCPs should educate patients with diabetes to perform regular foot self-examination and self-care. In addition, they should regularly carry out foot examination and care, including referral of the patient to a podiatrist, when available. However, the literature suggests that this does not happen. In a study that was conducted on patients with diabetes in Germany, Schmidt et al found that 33% had not performed foot self-examination, over 50% had not had their feet examined by HCPs, and 28% had not received foot care education.[15] With regard to the quality of patients' foot self-care practices, a study in Nigeria found that while only 30.1% of patients with diabetes had good knowledge of foot care, only 10.2% carried out good foot self-care practices.[8] The majority (78.4%) of patients with poor foot self-care practices had poor knowledge about it and were significantly likely to be of a low socio-economic status and poorly educated.[8] Poor foot self-care practices cut across all levels of health care, and even in an Indian tertiary facility, only 20.5% of patients with diabetes followed correct foot care practices.[16]

Apart from the provision of foot care education by a HCP, preventive self-care measures, such as foot self-examination and foot self-care, are important in addressing the burden of foot complications[10] that may accompany the projected increase in diabetes prevalence in South Africa. However, little data exist in South Africa on whether or not patients with diabetes are aware of the importance of personally caring for their own feet as part of their global diabetic self-care.[1,17] The only available data are those from a qualitative study which found poor foot care knowledge and poor self-care practices among patients with diabetes in the Eastern Cape.[18] Given this dearth of data, we determine awareness and foot self-care practices in a population of patients with diabetes. In this article, we report our findings and discuss the clinical and public health implications of diabetic foot care in South Africa.

Method

Study design and setting

This was a cross-sectional study conducted in the outpatient department of a 175-bed district hospital that forms part of a training complex for medical students and family medicine registrars at the University of the Witwatersrand, Johannesburg. At the time of the study, an average of 70 patients were attending daily, of whom approximately 10 were diabetic.

Study population, sampling and samples

All patients with diabetes, who were 30 years and older, attending the outpatient department during the study period, were eligible for inclusion. Patients who did not provide informed consent, and those who presented as emergencies, were excluded. A minimum age of 30 years was set for inclusion, as this increased the chances of finding diabetic foot problems.[1]A sample size of 83 was estimated, assuming a 95% confidence level, a prevalence of 8%, a population size of 300, and a sampling error of 5% using SSCPS® version 1001. This sample size was increased to 120 to compensate for possible incomplete and missing data. Consecutive patients with diabetes who met the inclusion criteria were recruited at the assembly point in the outpatient department before being attended by doctors. Recruitment continued during working hours daily, until the sample size was attained.

Data collection

Prior to the main study, a pilot study was conducted at the Gateway Clinic, situated outside the district hospital in order to assess the feasibility of the main study, but the questionnaires were excluded from the final analysis.

After explaining the nature of the study using an information leaflet, written informed consent was obtained. Participants completed a semi-structured questionnaire which was adapted from the Summary of Diabetic Self Care Activity, and were assisted where necessary by a research assistant. This questionnaire has been shown to be a reliable instrument in assessing self-care activities in patients with diabetes.[19] Information obtained included participants' socio-demographic data, clinical co-morbidities, awareness and foot self-care practices. On completing the questionnaire, the researcher performed a brief physical examination of the feet of the participants to document foot problems, if any. Participants were then placed in a fast-moving queue to be attended by a different doctor in the outpatient department in order to minimise the impact of time spent participating in the study on the overall time spent for the clinic visit.

Analysis

Information from the questionnaire was captured into Epi Info™ 3.5.1 and imported into Stata® 10 for analysis. Descriptive statistics was performed to describe participants' characteristics, and their awareness and foot self-care practices. Awareness of foot self care was assessed as the proportion of participants who had a positive response to the question: "Do you know that you should care for your feet personally?" In order to analyse the foot self-care practices, a modification of the revised version of the Summary of Diabetic Self Care Activity measure score was used.[19] According to this measure score, foot care activities that were not performed at all were classified as bad foot care practice, those for 1-4 days as poor practice, and those for 5-7 days as good practice. However, a reverse score was used for soaking the feet in water (a practice which should be discouraged),[20] no soaking of the feet was regarded as good foot care practice, soaking for 5-7 days per week as bad practice, and for 1-4 days as poor practice. Differences in foot self-care practice in the groups were tested using chi-square and t-tests. Logistic regression was used to determine associations between socio-demographic characteristics and the finding of a foot ulcer. Statistical significance for all tests was set at p-value < 0.05.

Ethics

Permission and approval for the study were obtained from the Human Research Ethics Committee of the University of Witwatersrand (Number M090203) and the Gauteng Department of Health. Participants gave written, informed consent and all data were kept confidential and responses coded.

Results

One hundred and twenty participants were recruited and completed the questionnaires. Women accounted for 60% (72) and men 40% (48). The mean age was 56.3 years. Most participants were blacks (59.2%), followed by whites (30.0%), Indians (3.3%) and those of mixed or coloured race (0.8%). Approximately 68.3% were unemployed, while 64.2% (77) had attained less than Grade 10 education. Other socio-demographic characteristics of the participants are shown in Table I.

The majority (70%) of participants reported having a co-existing medical condition. Hypertension was the most common medical condition reported by 85.7% (72) of those with co-morbidities. Other co-morbidities are shown in Figure 1.

Participants' general knowledge of diabetes and foot self-care was poor. 36.7% knew the type of diabetes from which they suffered, and only 24.2% were aware of the need to conduct foot self-care. Regarding foot self-

Table I: Participants' characteristics

Characteristic	n = 120, frequency (%)
Age group (years)	
30-49	37 (30.8)
50-69	64(53.3)
70 or older	19 (15.8)
Gender	
Men	48 (40)
Women	72 (6)
Marital status	
Divorced	15 (12.5)
Married	51 (42.5)
Separated	1 (0.8)
Single	32 (26.7)
Widowed	21 (17.5)
Employment	
Employed	38 (31.7%)
Unemployed	82 (68.3%)
Education status	
None	15 (12.5)
Less than Grade 10	77 (64.2)
Completed Grade 12	22 (18.3)
Diploma	4 (4.2)
University	1 (0.8)

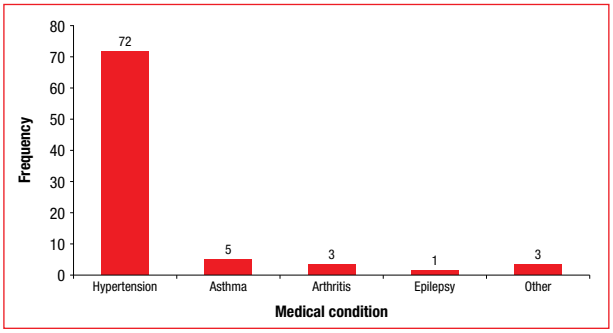

Figure 1: Distribution of co-existing medical conditions (co-morbidities)

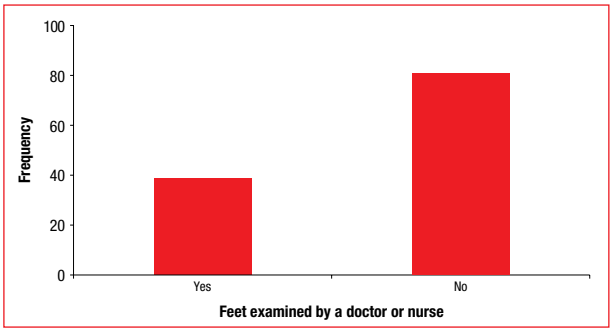

Figure 2: Proportions of participants whose feet were examined by a doctor or nurse

Table II: Participants' foot care practices

Foot care practices	n = 120				
	Yes, n (%)	No, n (%)	None n (%)	1-4 days n (%)	5-7 days n (%)
Have you ever cared for your feet personally?	86 (71.7)	34 (28.3)			
Have you ever had your feet examined by your doctor or nurse?	39 (32.5)	81 (67.5)			
On how many of the last seven days did you inspect your feet?			37 (30.8)	26 (21.7)	57 (47.5)
On how many of the last seven days did you wash your feet?			2 (1.7)	14 (11.7)	104 (86.7)
On how many of the last seven days did you use talcum powder to keep your feet dry?			111 (92.5)	4 (3.3)	5 (4.2)
On how many of the last seven days did you inspect your shoes before wearing them?			55 (45.8)	13 (10.8)	52 (43.3)
On how many of the last seven days did you soak your feet in water?			64 (53.3)	29 (24.2)	27 (22.5)
Do you walk barefoot inside and outside the house?	30 (25)	90 (75)			
Have you ever made use of a foot care specialist (a podiatrist)?	7 (5.8)	113 (94.2)			
Have you ever had a foot sore?	41 (34.2)	79 (65.8)			
Do you have other medical conditions?	84 (70)	36 (30)			

care practices, only 4.2% (5) used talcum powder to keep their feet dry, 47.5% (57) inspected their feet almost every day, and 86.7% (104) had washed their feet on at least five days in the last week. Although 71.7% (86) of participants reported having cared for their own feet, only 32.5% (39) had had their feet examined by a doctor or nurse, and 5.8% (7) by a podiatrist (Figure 2). Other foot self-care practices are as shown in Table II.

Table III illustrates the foot problems that were found on examination. It shows that the majority of participants (63.3%) had at least one foot problem. Athlete's foot was the most common, found in 16.2% of participants, while foot ulcers and amputation of any part of the foot were found in 5% (6) and 0.9% (1) respectively. Other foot problems that were discovered on examination are shown in Table III. There were no statistically significant associations between selected foot self-care practices (washing feet, use of talcum powder to keep feet dry, soaking feet in water, examination of the feet by a foot care specialist or walking barefoot) and the development of a foot ulcer. However, as illustrated in Table IV, of all the socio-demographic variables, cigarette smoking was the only variable that was significantly associated with the finding of a foot ulcer (odds ratio: 2.81, confidence interval: 1.09-7.24, p-value = 0.032).

Table III: Foot problems

Observed foot problem	Frequency	Percentage	Cumulative total
Amputation	1	0.85	0.85
Athlete's foot	19	16.24	17.09
Calluses	5	4.27	21.37
Corns	16	13.68	35.04
Dry, cracked foot skin	3	2.56	37.61
Hammer toe	7	5.98	43.59
Ingrown toenails	5	4.27	47.86
No observed foot problem	43	36.75	84.62
Thickened toenail	12	10.26	94.87
Ulcers	6	5.13	100

Discussion

As far as the authors are aware, this study is the first published report to document patients' awareness of the need to perform foot self-care and one of a few to document foot self-care practices in patients with diabetes in South Africa. It found that only 24.2% of participants were aware of the need to perform foot self-care. Foot self-care practices were poor in general. The poor practices were pronounced in the areas of shoes inspection, use of talcum powder to dry the feet and the use of HCPs to care for the feet. These findings confirm reports from South Africa and elsewhere that most patients with diabetes do not regularly care for their feet, and when they do, the level of self-care is poor.[14,18,21-23] They also highlight the huge gap that exists in diabetic foot care education in South Africa and

Table IV: Association of socio-economic characteristics with foot ulcers

Factor	Univariate model		p-value
	Odds ratio	Confidence interval	
Smoking status			
Non-smoker	1	(1.09-7.24)	0.032
Smoker	2.81		
Employment status			
Unemployed	1	(0.20-1.16)	0.103
Employed	0.48		
Alcohol			
No	1	(0.61-4.36)	0.280
Yes	1.83		
Family support			
No	1	(0.61-5.45)	0.073
Yes	2.02		
Education status			
No education	1	(0.41-4.83)	0.593
Up to Standard 8	1.49		
Completed secondary school	2.29	(0.55-9.47)	0.252
Diploma	0.69	(0.06-8.14)	0.766
Degree	-		

the need for interventions which enhance patient-empowerment regarding self-care.

Diabetic Self-Management Education (DSME) is one of the cornerstones of diabetic self-care, and when provided through an evidence-based, structured programme that is delivered by an informed educator, has been shown to improve outcomes of care, including a reduction in the risk of foot ulcerations and amputation.[1,24,25] However, the vast proportion of patients with diabetes are not given foot care education by their HCPs.[14] While the current study did not measure the provision of foot care education by HCPs directly, participants' awareness and poor foot self-care practices possibly reflect the failure of HCPs to educate patients with diabetes on the importance of performing regular foot self-care. Missed opportunities to provide education deny patients with diabetes the benefit of early identification of foot problems and reduced risk of foot ulcerations and limb amputations.[17,26,27]

Although DSME is an effective intervention, the low educational status of the majority of participants in this study may negate its benefits in this study population, and explain some of the other results. Previous studies have shown that low educational status is associated with poor knowledge of diabetes, increased risk of foot abnormalities and poor foot self-care practices.[7,8,13] These poor outcomes may result from difficulties that inadequately educated patients have in assimilating information and grasping self-care skills. Therefore, attention should be given to such patients during foot self-care education by assessing their level of knowledge of diabetes, its relationship to potential foot problems, their understanding of various aspects of foot self-care, and their self-efficacy in performing foot self-care.[20] Where gaps in knowledge and skills exist, the information to be given should be contextualised to the patient's level of understanding, and skills taught at the pace at which skills can be grasped. Unfortunately, the use of medical terms when communicating, as well as workload and time pressures, negate against HCPs providing health education during clinic visits. Therefore, HCPs need to be trained on how to effectively deliver DSME within these constraints, taking cognisance of the peculiarities and information needs of each patient.[24] Task shifting to other cadres of HCP, such as health promoters, who may have less work and time pressures, may be an alternative strategy to consider.

The IDF recommends inspection of the feet and shoes, as well as washing of the feet, as core tasks in diabetic foot self-care.[28] Areas of skin puncture, ulcers and redness should be checked, while shoes should be examined for softness, tightness and objects that may cause skin punctures. The aim of these inspections is to identify foot problems early before they become complicated. Therefore, it was encouraging that in this study, a significant proportion of participants reported regularly inspecting and washing their feet, and frequently checking their shoes. These findings are consistent with the reports of other studies.[29,30,31] Such good practices should be encouraged during clinic visits. However, in light of the poor awareness that was found in this study, participants' reports may not be a true reflection of their practices. Patients might have misinterpreted "looking at" as inspecting their feet, hence the high proportion that reported performing this task. However, the questionnaire was administered by researchers and opportunities were given for clarification. Nonetheless, whether intentional or not, patients with diabetes who regularly wash their feet are less likely to develop foot ulcers, compared to those who do not.[24] Therefore, HCPs should affirm patients

positive behaviour, in order to maximise the benefits of diabetic foot self-care.

Practices such as soaking feet in water and walking barefoot were reported by 46.7% and 25% of participants, respectively, and should be discouraged in patients with diabetes because they predispose to preventable foot injuries that lead to foot ulcers and lower extremity amputations.[24] Given that a significant proportion of participants reported this bad practice, HCPs should use the opportunities provided by clinic visits to correct misconceptions and bad habits by providing clear and practical advice on self-care skills.[17]

Although the majority of participants reported that they had sometimes cared for their own feet in the past, only 32.5% had had their feet examined by a doctor or nurse, and 5.8% by a podiatrist (Figure 2). The poor utilisation of HCPs for foot care by patients with diabetes is consistent with that of previous studies,[32] and may indicate that patients are unaware of the role played by HCPs in diabetic care. Since podiatrists are in short supply and are mainly found in the private health sector in South Africa, patients may also not be aware of their availability. Therefore, the shortage of podiatrists in the public health sector poses a serious challenge to achieving the recommendation of the IDF, that all patients with diabetes should receive an annual foot examination by a HCP in order to promptly identify patients at high risk of ulcerations.[22,33] Prophylactic foot examinations by HCPs have been found to decrease morbidity, lower utilisation of expensive resources, reduce the risk of lower limb amputation, and reduce premature death in patients with diabetes.[8] While other categories of HCPs could be trained to regularly examine the feet of patients with diabetes and to provide self-care advice, the need to manage diabetic foot complications in the face of an increased prevalence of diabetes in South Africa necessitates the urgent recruitment of podiatrists into the public health system.

In this study, the prevalence of athlete's foot and limb amputations were comparable with those reported in other studies.[7] However, the lifetime incidence of foot ulcers of 34.2% was higher than that reported in the literature,[5] and resonates with the poor foot self-care that was generally found in this setting. This finding buttresses the need for strategies that ensure that foot care education and foot examinations are carried out in, and foot self-care promoted to patients with diabetes to prevent foot ulcerations.

Smoking and diabetes are independent risk factors for peripheral vascular disease and foot problems. Therefore, the finding that smoking was significantly associated with foot ulcers in this study was consistent with the literature.[34,35] However, caution needs to be exercised in interpreting this result as only six patients were found to have a foot ulcer on physical examination. This small sample of patients with foot ulcers may explain the lack of statistical association with the other socio-demographic variables listed in Table IV. Nonetheless, smoking cessation intervention should be integrated into diabetic foot care education in order to motivate diabetic smokers to stop, and to discourage non-smokers from starting.

The findings in this study were largely based on self-reports. Therefore, they may be prone to information bias. The exclusion of patients with diabetes who were younger than 30 years old could have introduced a selection bias, but the need to increase the chances of encountering foot problems during the foot examinations necessitated this criterion. The selection of consecutive patients during working hours excluded patients with diabetes who presented at other times of the day. However, these patients were likely to be emergencies, and would have been excluded on that basis. The cross-sectional design precluded a causal effect and the small sample size made generalisation difficult. Nonetheless, although we did not use a nationally representative sample, the characteristics of participants in this study typify those of patients attending South African public healthcare services. In addition, the study findings mirror findings from previous studies conducted elsewhere, and given the paucity of data in South Africa, these findings have implications for the design of interventions and further studies in South Africa and similar settings.

Conclusion

Patients' awareness and foot self-care practices were generally poor and highlight a critical gap in diabetic care in South Africa. Health education programmes that empower patients with diabetes with regard to self-care need to be integrated into the consultation during clinic visits. In addition to training HCPs on diabetic foot care, setting up prompts in the medical records to remind HCPs to regularly perform foot care education and examination, and recruiting podiatrists into the public health services, are strategies that have the potential to improve diabetic foot self-care in South Africa and similar settings. Larger studies are required to further validate the findings of this study.

Conflict of interest

The authors declare that was no personal or financial conflict of interest that might have biased this study. The study was conducted in partial fulfillment of the requirements for the award of the MFamMed degree at the University of the Witwatersrand, Johannesburg.

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