Foot care and footwear practices among patients attending a specialist diabetes clinic in Jamaica

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Abstract

This study aimed to estimate the proportion of patients at the University Hospital of the West Indies (UHWI) Diabetes Clinic who engage in recommended foot care and footwear practices. Seventy-two participants from the UHWI Diabetes Clinic completed an interviewer-administered questionnaire on foot care practices and types of footwear worn. Participants were a subset of a sex-stratified random sample of clinic attendees and were interviewed in 2010. Data analysis included frequency estimates of the various foot care practices and types of footwear worn. Participants had a mean age of 57.0±14.3 years and mean duration of diabetes of 17.0±10.3 years. Fifty-three percent of participants reported being taught how to care for their feet, while daily foot inspection was performed by approximately 60% of participants. Most participants (90%) reported daily use of moisturizing lotion on the feet but almost 50% used lotion between the toes. In conclusion, approximately 85% of participants reported wearing shoes or slippers both indoors and outdoors but over 40% reported walking barefoot at some time. Thirteen percent wore special shoes for diabetes while over 80% wore shoes without socks at some time. Although much larger proportions reported wearing broad round toe shoes (82%) or leather shoes (64%), fairly high proportions reported wearing pointed toe shoes (39%), and 43% of women wore high heel shoes. Approximately 60% of patients at the UHWI diabetic clinic engage in daily foot inspection and other recommended practices, but fairly high proportions reported foot care or footwear choices that should be avoided.

Introduction

Foot complications are major causes of morbidity and disability in persons with diabetes mellitus.[1-3] Foot ulceration occurs in approximately 15-25% of people with diabetes while amputation prevalence ranges between 0.2-4.8%, worldwide.[3-6] In addition to the morbidity, diabetic foot complications are associated with high mortality.[7,8] In one study, foot ulceration was associated with a two-fold increase in mortality independent of the effect of age, diabetes type, diabetes duration, treatment and glycosylated hemoglobin.[7] Another study, in Barbados, reported that five year survival after lower limb amputation was only 44% compared to compared to 82% among those without amputation.[8]

The burden of diabetic foot complications is very high in the Caribbean region.[9-13] In one study from Barbados, Hennis and colleagues documented that the incidence of lower extremity amputation among the women in Barbados was second only to that of the US Navajo population.[10] Previous studies in Barbados had documented that on average 75% of surgical beds at the Queen Elizabeth Hospital were occupied by patients with diabetic foot problems.[11] In Trinidad, a cross-sectional study among patients attending primary health care clinics found that 12% of persons with diabetes reported previous foot ulceration and 4% reported previous amputation.[9] In Jamaica, we have found that among patients of attending the Diabetes Clinic at the University Hospital of the West Indies (UHWI), 8.5% had an amputation and 4% had a current foot ulcer.[13] In another study among patients with diabetes who were admitted to UHWI in 2004, six percent had an amputation during the given admission.[14]

The main risk factors for diabetic foot complications are peripheral neuropathy, peripheral vascular disease and foot deformity;[4,15] however improper footwear and inappropriate foot care are thought to be important contributors to diabetic foot complications.[16-20] The International Working Group on the Diabetic Foot and other professional bodies have put forward recommendations for appropriate foot care and choice of footwear which may reduce the risk of foot ulceration and amputations.[16,21-23] Some features of these recommendations include daily foot examination by patients or caregivers, (including the use of mirrors to examine the sole of the feet where necessary), daily washing and careful drying of feet, use of moisturizing lotion on the feet but not between the toes, avoiding corn removal with chemical agents, wearing well-fitting shoes and avoidance of walking barefooted.[16,22] Patients at high risk of foot complications such as those with loss of protective sensation and those with foot deformities may require specially fitted footwear to minimise the risk ulceration.[20,24] In light of these recommendations for foot care and footwear practice for persons with diabetes, we conducted this study aiming to evaluate foot care and footwear practices among patients attending UHWI Diabetes Clinic in order to determine the extent to which recommended practices are being followed.

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Materials and Methods

The study was conducted on a subset of participants in a cross-sectional survey of patients attending the UHWI Diabetes Clinic. The study was approved by the University Hospital of the West Indies, University of the West Indies,

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Faculty of Medical Science Ethics Committee. The original study was designed to estimate the prevalence of diabetic foot complications using a sex-stratified random sample of 188 patients from the clinic. Details of the study methods have been previously published.[13,25] A list of all 552 patients seen in the UHWI Diabetes Clinic in 2008 was used as the sampling frame, from which a sex-stratified random sample of 337 persons was selected, aiming to enrol 278 persons (assuming a 20% non-response rate). We successfully ascertained vital status or made contact with 253 (75%) of the potential participants of which 188 (56% of targeted sample; 74% of contacted persons) were enrolled. Participants were included in the study if they reported a history of doctor-diagnosed diabetes (subsequently confirmed by reviewing their medical records) and if they were patients of the UHWI diabetes clinic in 2008. If the invited participant did not report a history of doctor diagnosed diabetes or never attended the UHWI diabetes clinic they were excluded from the study. Seventy-two of the 188 participants recruited to the study completed an additional questionnaire on foot care and footwear practices during the latter half of the study. Interviews for this sub-study were conducted between March and September 2010. A general questionnaire was used to obtain data on demographics, socioeconomic status, diabetes history, cigarette smoking and alcohol consumption. The footwear and foot care questionnaire collected information on foot care education, ability to care for feet and current foot care practices. The specific foot care questionnaire items included are shown in Table 1. The questionnaire was developed by some of the authors (TSF, MKTR and SRM) after reviewing a number of foot care questionnaires. Some of the questions were selected from a diabetic foot care questionnaire from the American College of Physicians Clinical Skills Module on Diabetic Foot Ulcers.

Socio-economic status was assessed using information on education and employment obtained by the general questionnaire. Data on education level was collected in categories ranging from *no schooling* to *tertiary education*, and then was collapsed into two categories – *secondary or less* and *post-secondary* for analysis. Employment status was categorized as employed, unemployed or retired/ students/housewives. Data were also collected on cigarette smoking patterns and alcohol consumption patterns and participants placed into two categories - non-smokers and past/current smokers, and never drank alcohol and past or current alcohol consumption.

A capillary blood sample was collected for measurement of haemoglobin A1c (HbA1c) using the NycoCard Reader® II (Axis Shield, Oslo, Norway). Categories of glycaemic control were defined as: good control, HbA1c <7.0%; inadequate control, HbA1c 7.0-8.9%; poor control, HbA1c ≥9.0%.[21,26]

Statistical analysis was performed using Stata 10.1 (StataCorp LP, College Station, TX, USA). We obtained proportion of participants with positive responses to each of the questionnaire items and made comparison of differences in proportions for male and female participants. Bivariate analyses were performed using chi square (χ^2) test and Fisher's exact test where applicable. Statistical significance was set at $P<0.05$.

Results

The 72 participants included fourteen men and fifty-eight women. The mean age of participants was 57.0±14.3 years with no significant sex difference. Participants had a mean duration of diabetes of 17.0±10.2 years; mean age at diagnosis of 40.5±12.4 years; and mean HbA1c of 7.7±1.9%. There were no significant differences in the mean values for age, diabetes duration or HbA1c for the participants included in this analysis when compared with the full study sample.

The socio-demographic characteristics of the study participants are shown in Table 2. Sixty-four percent of the men were employed compared to 36% of the women. Just over 30% of the participants reported having attained post-secondary education. A third of participants were current or past smokers while 32% reported current alcohol use. Sixty-one percent were currently on insulin and 40% had good glycaemic control (HbA1c <7%).

Foot care education

Fifty-three percent of participants reported ever being taught how to care for their feet with no difference between men and women. The majority of persons, who were taught foot care, were educated by doctors (29%) or nurses (25%). Three participants reported being taught by a podiatrist while the others reported being taught by unspecified persons at the clinic or by a family member. Only 28 women (49%) and one man reported ever reading an educational handout on diabetes foot care.

Foot care practices

The proportion of participants performing the various foot care practices is shown in Table 3. Daily foot inspection was performed by just over 60% of participants. Almost all participants reported washing their feet daily with 90% ensuring that they dried in between toes. Most participants (especially women) reported daily use of moisturizing lotion on the feet but almost 50% used lotion between the toes. Most participants reported wearing shoes or slippers both indoors and outdoors, but over 40% reported walking barefooted at some time. Less than 50% of participants checked the

Table 1. Questionnaire items used in the study.

Questionnaire items for foot care and foot wear practices
Foot care education
Have you ever been taught how to care for your feet?
Have you ever read an educational handout about foot care?
Ability to care for your feet
Can you reach and see the soles of your feet?
Current foot care
Do you or an assistant inspect your feet daily for problems?
Do you wash your feet every day?
Do you dry thoroughly between the toes?
Do you put moisturizing lotion on your feet daily?
Do you put moisturizing lotion between your toes?
Do you have another person cut your toenails or trim your calluses?
Do you wear shoes or slippers both outdoor and indoor?
Do you walk bare-footed at any time?
Do you use footwear in the shower?
Do you always test water temperature with your hand before putting your foot in?
Do you use corn plasters or corn cure?
Do you check your shoes for objects that might have fallen into them?
Your current footwear
Do you wear special shoes because you have diabetes?
Do you wear protective inserts in your shoes?
Do you ever wear shoes without socks?
Do you wear any of the shoe types below at any time?
[road, round toes, pointed toes, slippers (no back/heel section), open toes, athletic shoes (sneakers), leather, canvas, high heels' plastic, working boots (for construction sites, etc.)]

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water temperature with their hands before putting their feet in, while very few (19%) reported using footwear in the shower. There were no significant associations between foot care practices and socio-demographic factors in bivariate analyses.

Footwear

Approximately 13% of participants reported wearing special shoes because of diabetes. Only 10% of participants wore protective shoe inserts, while over 80% wore shoes without socks at some time. Proportions were similar for both men and women. The frequency with which various types of shoes were worn is shown in Figure 1. Patterns were generally similar for both men and women except for more frequent use of open toe footwear for women. Although much larger proportions reported wearing broad round toe shoes and leather shoes, significant proportions reported wearing pointed toe shoes, and 43% of women wore high heel shoes. There were no significant associations between footwear types and socio-demographic factors in bivariate analyses.

Discussion

In this study we found that although approximately 60% of patients at the UHWI Diabetes Clinic engaged in some recommended foot care practices, fairly high proportions reported foot care or footwear choices that should be avoided; in particular, walking barefooted, wearing shoes without socks and wearing pointed (narrow) toe shoes. In addition, almost a half of the study participants reported that they had never been taught about foot care. Comparable data on footwear and foot care practices in Caribbean populations are limited. Two studies, one from Trinidad[9] and the other from Barbados[10] have reported some data. In Trinidad 49% of patients attending primary care diabetes clinics reported walking barefooted inside the house and 23% walked barefooted outside the house. In Barbados, 39% of cases of persons who had amputations reported walking barefooted in the garden compared to 18% of controls who did not have amputations. In that study, walking barefooted was associated with an almost two-fold increase in the odds of amputation. The Barbadian study also showed that while the majority of participants wore broad leather shoes, sneakers, rubber sandals and *fashion shoes* were also frequently worn. In both studies the questions were asked in a different manner from the current study, hence the data are not directly comparable. However, both studies highlight that foot care and footwear practices were sub-optimal and the Barbados study made evident the effect of improper foot care and footwear practices in increasing amputation risk. Overall these studies highlight the need for greater emphasis on foot care education to improve knowledge and practice among patients with diabetes, as the problems highlighted in this study are not limited to the Caribbean. This is supported by the finding of similar gaps in knowledge and practice in studies from disparate countries, including the USA, Nigeria and India.[27-29] For example, in one study from India 44.7% of patients reported receiving no previous foot care education and 45% walked barefooted indoors,[27] while in a study from Nigeria only 40.9% of patients practiced daily foot inspection and 38% usually walked barefooted.[28] Another study among vet-

Table 2. Proportion of participants with various socio-demographic characteristics for men, women and total sample.

Characteristic	Category	Male % N=14	Female% N=58	Total% N=72
Age	Less 50 years	28.6	24.1	25.0
	50 years and older	71.4	75.9	75.0
Employment status**	Employed	64.3	36.2	41. 7
	Unemployed	28.6	13.8	16.7
	Retired/housewife/student	7.1	50.0	41.7
Highest grade of education	Secondary or less	78.6	65.5	68.1
	Post-secondary	21.4	34.5	31.9
Lifetime smoking***	Never smoked tobacco	14.3	79.3	66.7
	Past or current smoke	85.7	20.7	33.3
Current or past alcohol use**	Never drank alcohol	28.6	77.6	68.1
	Current or past alcohol	71.4	22.4	31.9
Duration of DM	Less than 20 years	64.3	48.3	51.4
	Twenty years or more	28.6	27.6	27.8
	Missing	7.1	24.1	20.1
Glycemic control*	Good (HbA1c <7.0%)	64.3	34.5	40.3
	Inadequate (HbA1c 7-8.9)	35.7	37.9	37.5
	Poor (HbA1c ≥9%)	0	27.6	22.2
Insulin therapy	Never	42.9	24.1	27.8
	Current	57.1	62.1	61.1
	Past	0	13.8	11.1

*P<0.05; **P<0.01; ***P<0.001; P-values are from Fisher's exact test for male:female differences. DM, diabetes mellitus; HbA1c, haemoglobin A1c.

Table 3. Proportion of persons engaging in various foot care practices for men, women and total sample.

Foot care practice N=14	Male % N=58	Female% N=72	Total%
Recommended practices			
Daily foot inspection by patient or an assistant	71.4	60.3	62.5
Wash feet every day*	85.7	100	97.2
Dry thoroughly between the toe	85.7	91.3	90.2
[1]Use moisturizing lotion on feet daily**	57.1	93.0	90.3
Have an assistant cut toenail or trim calluses	85.7	70.7	73.6
Wear shoes or slippers both indoor and outdoor*	64.3	89.7	84.7
Use footwear in the shower	21.4	19.0	19.4
Test water temperature with hand before putting feet in	35.7	51.8	48.6
Check shoes for objects that might have fallen in them before putting shoes on	78.6	87.9	86.1
Practices that are not recommended			
Put moisturizing lotion between the toes	42.9	50.9	49.3
Walk barefooted at any time	50.0	43.1	44.4
[2]Use corn plaster or corn cure	0	3.6	2.9

*P<0.05, **P<0.01, ***P<0.001 for male:female difference; [1]N=71; [2]N=68.

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erans in the United States found that a majority of participants felt that they did not know enough about foot self-care, with only 32% reporting that they looked at the bottom of the feet and 33% checking shoes for objects, while 41% of patients reported walking barefoot indoors. It is therefore apparent that patients with diabetes, particularly those without overt complications, receive little information about foot complications and how these might be avoided.[23,30,31] We therefore support recommendations that all patients with diabetes should be offered foot care education aimed at improving foot care related knowledge and practice and thus reducing the risk for foot complications.[16,21-23]

The findings of this study are limited by the small sample size and the fact that it was conducted in a specialist diabetes clinic and as such may not be broadly generalizable. The findings are however consistent with other studies as cited above and therefore suggest that the situation may be similar among persons with diabetes in Jamaica and the Caribbean. The small sample size also limited our ability to demonstrate any associations between foot care practices or footwear and socio-demographic factors. Despite these limitations, these data highlight the need for further studies with larger, representative, samples to better understand the problem at a national level. We also believe that publication of these findings will serve as a catalyst for further studies in the subject area, where clinicians and researchers can evaluate the extent to which appropriate practices are being followed in their setting. Additionally prospective studies that evaluate the impact of foot care and footwear practices on outcomes such as foot ulcers and amputations would further help to determine the potential for interventions to improve practice and reduce complications.

Overall, the study highlights the need for greater emphasis on foot care education for patients with diabetes in Jamaica and the need to identify barriers to foot care practice, both as it relates to the physician and to the patient. This would then lead to studies evaluating the efficacy of various intervention strategies in order to provide evidence-based guidelines for practice.

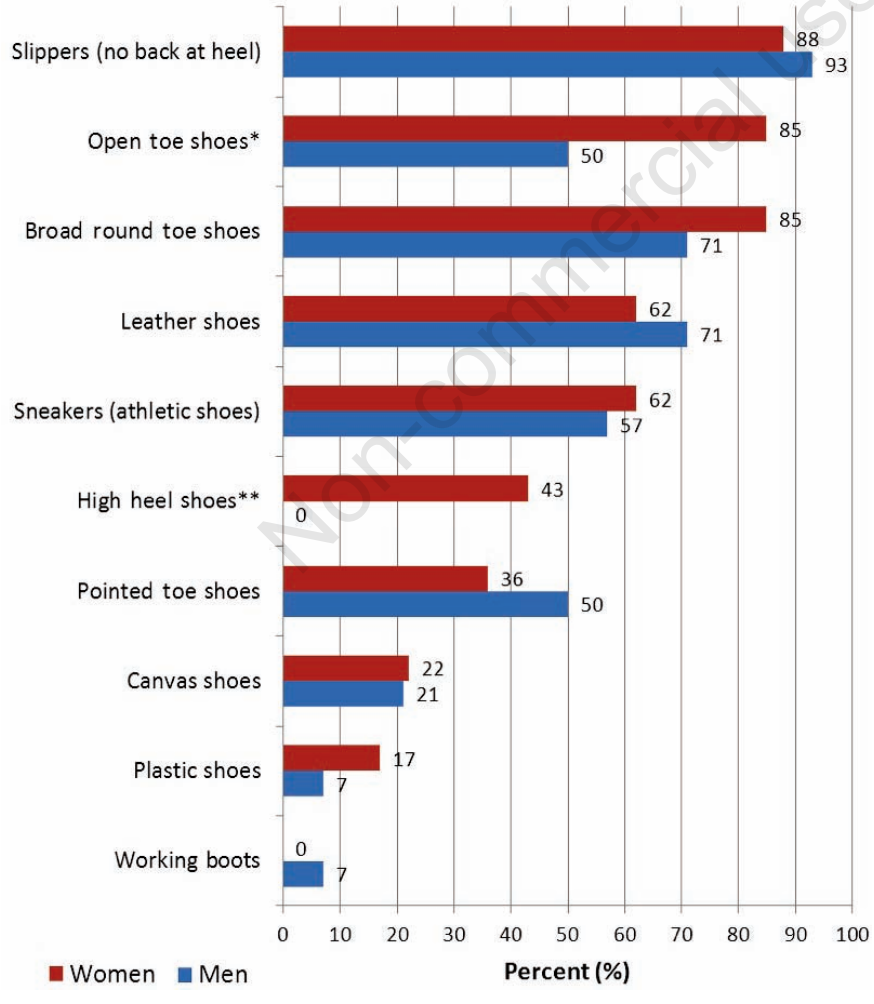


Figure 1. Proportion (%) of participants (men and women) who wear various types of footwear (*P<0.05, **P<0.01 for male:female difference).

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