

# Footcare practices among Nigerian diabetic patients presenting with foot gangrene

I A Ikpeme, A M Udosen, N E Ngim, A A Ikpeme, P Amah, S Bello, and S Oparah

## Abstract

Diabetic foot ulceration and gangrene is a major cause of morbidity and mortality. This study has examined potential preventive footcare practices in a cohort of diabetic patients presenting with foot gangrene. One hundred and two (102) diabetic emergencies presented during the study period. Diabetic foot gangrene accounted for 27 (26%) of these cases. There were 18 males and 9 females (M:F = 2:1), with a mean age of 52±13 years. The mean duration of ulceration was 4±3 weeks and mean ulcer-gangrene interval was 1.2±0.5 weeks. Only 9 patients (33%) had been exposed to any form of footcare education, 15 patients (55%) treated their ulcers by unorthodox means, and 63% of the patients practiced no significant footcare. More widespread education and awareness is needed to prevent the continuing and serious problem of diabetic foot gangrene and consequent lower limb amputation.

## Introduction

Foot complications of diabetes are a common cause of hospitalisation among diabetic patients and foot ulcers develop in about 15%.<sup>1</sup> Infected foot ulcers frequently progress to gangrene, and precede 85% of lower limb amputations in American diabetes patients.<sup>1</sup> A Nigerian study has documented diabetic foot gangrene as the leading indication, accounting for 58%, of major limb amputations over a 5 year period<sup>2</sup>. Prevention and judicious management of foot disorders are therefore of significant importance in diabetics if infective complications, which may progress to gangrene requiring amputations, are to be reduced.

Diabetic foot ulceration results from a combination of factors, e.g. neuropathy, peripheral vascular disease, callosities, oedema, and deformity. The commonest source

of trauma is inappropriate footwear.<sup>3</sup> A combination of hyperglycaemia and impaired white blood cell phagocytic activity predisposes to infection of ulcers, which can result in gangrene necessitating amputation. Preventive strategies, such as patient education and footcare (including use of appropriate footwear) are cost-effective and cheaper than the cost of treating foot ulcers<sup>1</sup> or the loss of a limb. In societies where amputation is considered a taboo and difficult to accept, prevention of foot ulceration with the attendant risk of amputation not only prevents stigmatisation and psychological trauma but also frees scarce resources for other socio-economic needs.

Diabetic foot-care practices are simple and include daily foot inspection for injuries, callosities and oedema; foot wash with lukewarm water and mild soap, thorough foot drying especially between the toes, and foot protection with comfortable, well-fitting shoes. Others are the avoidance of direct heat, heating pads, and hot water bottles to the feet; avoidance of hot pavements, hot sandy beaches, and limitation of exposure to cold with simple devices like warm socks. Application of a thin coat of petroleum jelly, cutting the nails straight across after a soak in lukewarm water, avoidance of caustic antiseptics, wearing footwear at all times, daily exercises to promote circulation, discontinuation of smoking, early reporting of all injuries and blisters, and avoidance of self-medication for foot problems are other preventive footcare practices. This paper aims to highlight the level of awareness of these practices amongst Nigerian diabetic patients presenting with foot gangrene in our hospital.

## Patients and methods

A prospective questionnaire-based study of all diabetic patients presenting with foot gangrene in the University of Calabar Teaching Hospital was carried out. The Wagner wound classification system was used<sup>4</sup> to describe diabetic ulcers, and grades 4 and 5 were offered limb amputation.

The questionnaire requested information on demographic data, educational level, rural versus urban residence, duration of diabetic illness, duration of neuropathy, and the ulcer-gangrene interval. Details of methods of treatment of ulcers, examination and treatment by physicians, and health education on footcare were also sought.

Diabetic footcare practices were reduced into 11 easy-to-understand modalities and patients were required to

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state if they were aware of these and which one(s) they had practised. Information collected was analysed using SPSS version 14.0.

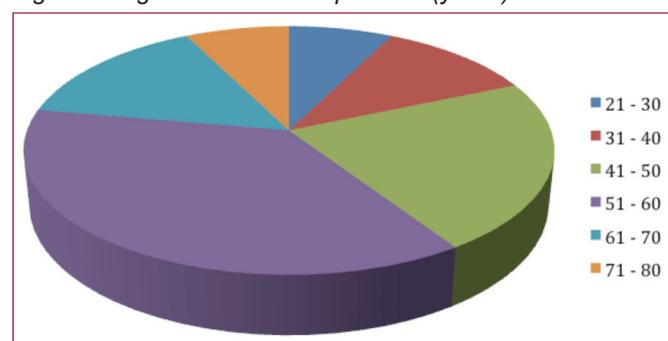
## Results

There were 102 important diabetes emergencies during the period of study. Foot gangrene accounted for 27 (26%) of cases. There were 18 males and 9 females (M:F = 2:1) with an age range of 24–75 years (mean  $52 \pm 13$  years). Nineteen (19) patients were urban dwellers while 8 patients lived in the rural areas. The mean duration of diabetes (from time of first diagnosis) was  $71 \pm 42$  months (range 0.5–144 months) and mean duration of ulceration was  $4 \pm 3$  weeks (range 1–12 weeks). The mean ulcer–gangrene interval was  $1.2 \pm 0.5$  weeks (range 0.5–2 weeks) (see Table 1 and Figure 1).

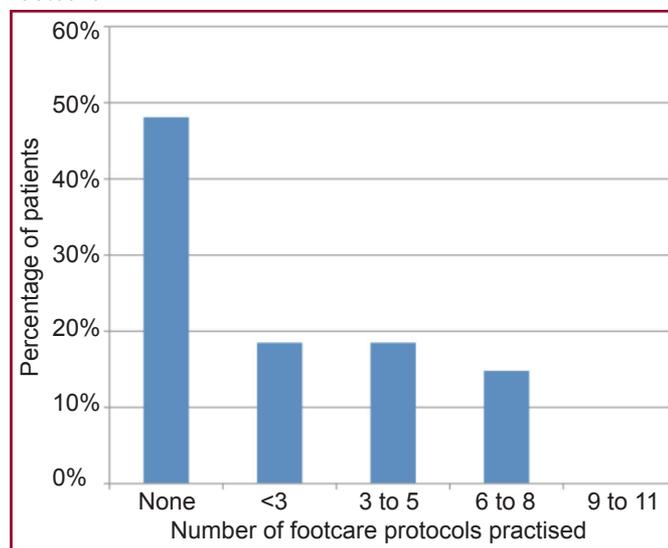
*Table 1 Patient and ulcer details in 27 diabetic patients presenting with foot gangrene (means  $\pm$  SD with range)*

Age (years)	$52 \pm 13$ (24–75)
Duration of diabetes (months)	$71 \pm 42$ (0.5–144)
Ulcer duration (months)	$4 \pm 3$ (1–12)
Ulcer–gangrene interval (weeks)	$1.2 \pm 0.5$ (0.5–2.0)

*Figure 1 Age distribution of patients (years)*



*Figure 2 Proportion of patients practising any form of footcare*



The median duration of neuropathy was 18 weeks (range 1–208 weeks). Only four patients (15%) had benefited from a foot examination prior to the onset of ulceration/gangrene; nine patients (33%) had been exposed to any form of footcare education, five (55%) of these by a physician. Fifteen (15) patients (55%) treated their ulcers by unorthodox means which included self-medication and spiritual/traditional healers. Seventeen (17) patients (63%) practiced no significant footcare in the course of their diabetic illness. Figure 1 shows the age distribution of the patients, while Figure 2 shows, in a bar chart, the percentage of patients who practiced any form of footcare.

## Discussion

Three per cent (3%) of diabetic patients will have a lower limb amputation.<sup>4</sup> Infected ulcers are the commonest precursors of gangrene and amputation in these patients. There are an estimated 1 million diabetes-related amputations per year<sup>5</sup> and 50% of amputees will lose the contralateral leg within 1 year.<sup>6</sup> Neuropathy and ischaemia, combined with hyperglycaemia and white blood cell dysfunction, predispose diabetic patients to trauma, ulceration, and infection. Lower limb amputations occur 10–30 times more often in diabetes than in the general population<sup>7</sup>. Footcare practices may significantly lower foot ulcer rates in diabetes<sup>1</sup> and prevent the progression to gangrene and consequent amputation. In developing countries, the resources are scarcely available to properly treat diabetic patients with complications. Prevention is therefore the preferred management option.

Ethnic differences in the prevalence of diabetic complications including foot ulceration and amputations have been documented.<sup>8</sup> Amputation risk is two-to-three-fold higher in African-Americans compared with Caucasian Americans. Inequalities in access to healthcare, and socio-economic and environmental factors such as education and smoking, are some reasons for this difference<sup>9,10</sup>. The role of unequal access to healthcare and socioeconomic/environmental factors may be buttressed by reports that blacks may have a lower prevalence of neuropathy, which is a major risk factor for ulceration<sup>8</sup>. The documented risk factors for increased ulceration and amputations in the black American population are operational in the black population of our developing economy. The poor rate of compliance and glycaemic control in our local population has also been documented<sup>11</sup> and contributes to the development of complications.

Diabetic foot clinics and multidisciplinary care have had a documented positive impact in the reduction of foot and other complications among diabetics in the developed world.<sup>12</sup> Specialised clinics offering multidisciplinary care for specific syndromes, with the documented advantages, are not yet widespread in the developing world. Many developing countries are battling with the provision of basic healthcare for their people. Health education and preventive care, therefore, remain the sheet-anchor for healthcare services in these regions.

Fifty-nine percent (50%) of patients in this study who had foot gangrene requiring amputation were in the first five decades of life. In societies with poor social support services/facilities (as in the developing world) this large percentage of individuals within the first five decades of life, who had a limb amputation due to gangrene with the attendant risk of 50% of these losing the contralateral leg within 1 year,<sup>6</sup> has a huge socio-economic impact on society. Many of these individuals are males (67% in this study) and are the breadwinners for their families. The real cost of the diabetes and limb loss therefore includes not only treatment costs,<sup>13</sup> but stigmatisation and the risk of hunger and denial of access to education for their children and other dependents from inability to source incomes for school fees and other expenditure. This fuels the cycle of hunger, poverty, illiteracy and disease in the developing world.<sup>14</sup> In societies with already stretched healthcare budgets, simple preventive steps will free resources for other socio-economic demands and provide human resources to fuel the productive sectors.

Thirty-three per cent (33%) of the patients in this study had been exposed to some form of footcare education, while 15% had benefitted from foot examination prior to ulceration/gangrene. The role of the spiritual/traditional healer in African societies has been documented.<sup>15,16</sup> Fifty-five per cent (55%) of the respondents in this study sought spiritual or traditional treatment for their ulcers and early gangrene. The pressure on health facilities in the developing world combined with unproven traditional medical practices provide a retroactive couple militating against judicious treatment interventions, and fuel the development of avoidable complications in these patients. Health education aimed at prevention of the complications of diabetes must be simple and efficient. The use of footcare cards and public enlightenment jingles is strongly advocated. Radio and television are being used effectively to fight the spread of HIV/AIDS in many poor regions of the world. When diabetes is properly identified as a major health scourge, the lessons derived from public health campaigns on HIV/AIDS will help the diabetes campaign.

Only about 26% of the patients in this study practise up to 5 out of the 11 modalities on the simplified footcare protocol used in this study.<sup>7</sup> Whereas the efficacy of several proposed approaches to prevention remain unproven and optimal approaches to diabetic education are uncertain, patients at risk for foot ulceration need to understand the implications of loss of protective sensation.<sup>4,17</sup> They need also to learn to seek out and recognize impending foot complications. A mean duration of ulceration of  $4 \pm 3$  weeks and mean ulcer-gangrene interval of  $1.2 \pm 0.5$  weeks, combined with 55% of patients seeking unorthodox treatment for their foot ulcers, point to late

presentation being a significant cause of morbidity in the diabetic population in this study.

Literature from the developing world has identified many reasons for late presentation of patients to hospitals. These include fear of orthodox medical practices, inadequate transport and ignorance translated into patronage of spiritual houses, traditional healers and prayer homes.<sup>17-19</sup> Many of these factors are ameliorable with appropriate prioritization of healthcare policy and a conscious and realistic redistribution of health resources in these regions. The prevalence of rudimentary treatment options, poor technology and poor funding of the health sector implies that health education to confront competing prevalent charlatanism and superstition,<sup>17</sup> could reduce gangrene and limb amputation rates in diabetes.

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