

# “Diabetic Holiday Foot Syndrome”: Home and Away

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## Abstract

Diabetic foot ulceration is a serious complication of diabetes mellitus worldwide. It is the most common cause of hospitalization in diabetic patients and is the most frequent cause of nontraumatic amputations. Furthermore, diabetic foot disease can impair patients' quality of life and affect social participation and livelihood. People with diabetes have a higher risk of foot ulceration during holidays, especially those taken in hot countries for various causes. These causative factors may also coexist at home. In this clinical vignette, two case histories, several photographic illustrations, and a focused review of the relevant literature are presented with the view of alerting practicing clinicians to such encounters.

**Keywords:** Burns, diabetic foot, holiday, neuropathy, wound healing

## INTRODUCTION

Foot disease affects nearly 6% of people with diabetes and includes infection, ulceration, or destruction of tissues of the foot.<sup>[1]</sup> It can impair patients' quality of life and affect social participation and livelihood. Diabetic foot ulceration is a serious complication of diabetes mellitus worldwide and the most common cause of hospitalization in diabetic patients and is the most common cause of nontraumatic amputations.<sup>[1,2]</sup> Most amputations start with ulcers and can be prevented with good foot care, risk assessment, and education.<sup>[2]</sup>

The etiology of diabetic foot ulcerations is complex due to their multifactorial nature. In the pathophysiology of the diabetic foot, ulceration polyneuropathy is essential.<sup>[3]</sup> People with diabetes have a higher risk of foot ulceration during holidays,

especially those taken in hot countries for various causes.<sup>[4-9]</sup> Patients on holiday usually change their routine and may become careless in routine care of their feet. The name “diabetic holiday foot syndrome” (DHFS) was coined to underscore the higher risk of foot ulceration during holidays, especially those taken in hot countries.<sup>[4-10]</sup> However, these circumstances may also occur at home when the causative factors coexist.

In this clinical vignette, two case histories are presented, several clinical illustrations are shown, and the relevant literature is reviewed, aiming to

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alert the practicing clinician to expect the unexpected both at home and away.

## CASE REPORTS

These two cases are similar, yet they occurred under different circumstances.

### Case 1

A 56-year-old retired civil servant man was presented on the post take ward round having been admitted over the weekend. On arrival at the bedside, the patient promptly greeted the consultant with his full name as apparently he was seen once in the diabetes clinic <2 years previously. His records revealed that his diabetes control was well on metformin only, but he reduced sensation in his feet. He interrupted his holiday in Cyprus to return home, having sustained the foot lesions illustrated in Figure 1a. He vividly described the events: “having settled in their beach shack, I changed and walked on the beach to the sea. Having enjoyed a nice swim, I walked back fully refreshed only to find my wife yelling at me, as I seemed to mess up the floor of the hut with reddish fluid wherever I stood or walked.” The patient sought help from



**Figure 1:** The appearance of the sole of the feet on admission is shown in (a) and the uncharacteristically speedy healing after 1, 6, and 12 weeks is seen in b, c, and d respectively

the emergency services who cleaned the large blisters that turned to ulcers [Figure 1a]. The couple decided to return home prematurely, and the patient was admitted to his local hospital on arrival. The patient was treated with antibiotics, off-loading, and dressing for a couple of weeks and was followed up in the diabetic clinic till the lesions entirely healed within 12 weeks [Figure 1b-d]. Having no protective sensation in his feet, the most likely course of events was that he sustained bilateral foot burns from walking on the hot sand leading to blister formation when he went into the sea. The blisters broke when he walked back on the sand back to his hut.

### Case 2

A 48-year-old civil pilot retired on the grounds of ill-health. He suffered from retinopathy, neuropathy, and poor physical fitness. He turned up at the diabetes clinic in Abu Dhabi for a refill of medication. As he was not seen for a >1 year, his nominated physician was surprised that he was in a wheelchair with fully dressed feet lesions. On further inquiries, he reported sustaining foot ulcers in both of his feet and was admitted elsewhere for management. The patient shared from his cellular phone photographs of his foot lesions undisguisable from those in Figure 1a and b. He reported that the foot ulcers occurred during lunchtime during the recent hot summer when he went to the mosque for Friday prayers. The scenario is illustrated in Figure 2.



**Figure 2:** The typical appearance of a mosque entrance for Friday mid-day prayers. The burn shown in Figure 1 could occur for any person with insensible neuropathic feet, taking off his footwear away from the shade (short arrow) and strolling on a scorching ceramic pavement to the entrance on such a hot day (long arrow). Patient education should include discouragement of such practices

## DISCUSSION

Diabetic polyneuropathy is the most prevalent complication of diabetes.<sup>[3]</sup> Foot ulceration in diabetic patients is a serious complication, with the potentially devastating possibility of lower limb amputation.<sup>[1]</sup> Diabetic foot lesions become limb-threatening from a combination of injury, infection, and impaired circulation.<sup>[2,3]</sup> When diabetic patients go on holiday, they usually change their routine and may become careless in routine care of their feet. The name “diabetic holiday foot syndrome” was coined to underscore the higher risk of foot ulceration during holidays, especially those taken in hot countries.<sup>[4-10]</sup> DHFS is a significant diabetic complication. The typical lesion is a neuropathic plantar foot ulcer which heals well when appropriately treated. However, complications resulting from deep infections of soft tissue or bone, together with reduced peripheral blood flow, may necessitate amputation of the lower limbs.<sup>[4-10]</sup>

Stanaway *et al.* described for the first time the DHFS in six patients with type 2 diabetes mellitus (T2DM) who developed significant neuropathic foot ulceration during holidays, mostly in hot countries abroad. All were male, aged 52–62 years, and one patient developed three ulcers on the same foot on three consecutive holidays, the last one resulting in a below-knee amputation.<sup>[5]</sup> In the same issue of the journal, one of the largest series of diabetic holidaymakers was described, 17 out of 435 travelers experienced foot lesions during foreign holidays<sup>[6]</sup> 10 of whom reported a foot lesion for the first time. Some variants were also described in detail.<sup>[7,8]</sup> Lauterbach *et al.* studied the prevalence of DHFS and its risk factors in general practice in the UK using the database (on 4.2 million patients).<sup>[9]</sup> Data from 36,774 patients with diabetes were analyzed; DFS was evident in 7.6% and 8.5% of patients with type 1 diabetes mellitus and T2DM, respectively. More recently, O’Hare *et al.* described seven middle-aged Irish-born male diabetic patients who developed serious foot lesion on holiday.<sup>[10]</sup> Their median age was 59 years, 6 of them had T2DM for 1–30 years, and the median glycosylated hemoglobin (HbA1c) was 9.6%. The first case is a classic example of DHFS in its onset, clinical features,

and favorable outcome. The distinguishing features of DHFS-type ulcers and the classical neuropathic ulcers are described in Table 1 and Figure 3. The history of the circumstances and clinical features are diagnostic. The lack of callous and abnormal pressure distribution encourages healing in response to treatment [Table 1 and Figure 3].

Results from this analysis of one of the large representative databases showed that even though the prevalence of DHFS among patients with diabetes mellitus is relatively low, the prevalence of its main risk factors is high.<sup>[9]</sup> Many more patients were at high risk of developing DHFS, with diabetic neuropathy, diabetic angiopathy, foot mycoses, and open wounds of the feet. Preventive efforts should target these risk factors. DHFS may be caused by direct injury, unaccustomed exercise, walking barefoot on the beach or in the sea, burns from walking barefoot on hot sand pavements, and wearing inappropriate inflexible bathing shoes.<sup>[5-10]</sup> The specific causes of ulceration were often related to walking barefoot (on sand, shingle, or hot flagstones) or wearing inadvisable beach footwear.<sup>[5-10]</sup> The association of poor educational compliance and a high-risk environment may lead to this specific DHFS.<sup>[5]</sup>

The Irish series described the frequency of the types of foot lesions.<sup>[10]</sup> The lesions included massive blisters, ulceration, pressure necrosis, and maceration. Infection was present in the



**Figure 3:** The remarkable differences between appearances of the diabetic holiday foot syndrome lesions shown on the left (a) and the classical neuropathic diabetic foot lesions (b)



majority. Two of seven patients required partial foot amputation. Two had a hospital stay over 60 days. Healing took 4–20 weeks. All walked more than was their customary habit and often on uneven surfaces. One walked barefoot for a week incurring deep plantar ulceration. Another wore tight golf shoes incurring pressure necrosis. One walked extensively in an orthopedic boot. The majority wore sandals resulting in tissue maceration and infection. Table 2 describes the summary of the recognized causes of DHFS and the typical patient profile.

The weekly mass prayers for Muslims happen on Friday and are held around noon at large mosques only. Hundreds of Muslims gather in every mosque, and before entering the mosque, they leave their shoes or slippers outside [Figure 2]. The second case in the present report is similar to the 12 cases described even before the name DHFS was coined.<sup>[11]</sup> The 12 patients sustained feet burns because of standing or walking barefoot on the street before or after the

prayers during the hot summer in Saudi Arabia.<sup>[11]</sup> These injuries may occur during the summer months when the ground temperature is estimated to be in the range of 50°C–60°C in the Arabian Gulf Region. Eight of the ten adults described had diabetes with significant peripheral neuropathy and developed deep burns that involved the entire weight-bearing area of the sole. The insensate nature removes the protective mechanism and worsens the degree of injury.<sup>[12,13]</sup>

Several anecdotes are available from medical colleagues on local experience in the Arabian Gulf Region.<sup>[14]</sup> One physician described a case of unilateral deep plantar ulceration that occurred due to hot ground burn. The patient's sandal fell off and he could not appreciate it due to neuropathy. He walked home to discover the ulceration of his foot on arrival. Four physicians reported five patients from Bahrain, the United Arab Emirates, and Saudi Arabia with diabetes and neuropathy who lost their footwear in the crowds during performing of Hajj or Umrah. They walked back to their hotel barefoot only to discover the burns that turned into ulceration in four of them.<sup>[14]</sup> A unique experience with burns occurs in Al Ain and Dubai during the private and organized events of “Hot Sand Endurance” competitions. Young and unaccustomed persons try to match the experiences of their ancestors by running on hot sand. Several admissions and emergency attendances with various degrees of burns and ulcerations were recalled by doctors. Surely, many more cases must have passed unnoticed and have not been documented. Physicians, reflexologists, and health style advisors who get interviewed should warn people with diabetes and neuropathy from the increased risks associated with these activities.<sup>[15]</sup>

The prevention, as well as treatment of DHFS, has to be improved in order to achieve St. Vincent's targets. The feet of diabetic patients must be inspected regularly, and the patients must be educated appropriately. Detailed information on avoidable risk factors and the availability of protective footwear are essential for the prevention of DFS. This was not the case in either of the reported patients. Intensive warning education for the at-risk patients going on

**Table 1: The differences between the ulceration in the classical diabetic foot and diabetic holiday foot syndrome**

Ulcer characteristics <sup>a</sup>	Classical neuropathic foot	Diabetic holiday foot syndrome
Size	Smaller	Larger
Depth	Deeper	Less deep
Site	At pressure points	Not at pressure points
Shape	Rounded or oval	Geographical
Side	Unilateral	Bilateral
Foot deformity <sup>b</sup>	Characteristic	Not characteristic
Association with callous	Surrounded by callous	Not surrounded by callous
Potential for healing <sup>c</sup>	Low and slow	Better

<sup>a</sup>Descriptions are expressed in relative terms to each other rather than in absolute sense, <sup>b</sup>Abnormalities such as high arch and clawing leading to abnormal pressure distribution, <sup>c</sup>Healing in response to off-loading, debridement, and antibiotic therapy

**Table 2: Recognized causes of injuries during holidays and the profile of higher-risk people with diabetes who are likely to sustain them**

Causes of injuries	Higher risk individuals*
Direct injury	Males
Unaccustomed exercise	Younger to middle-aged patients
Walking barefoot on the beach or in the sea	Diabetes of variable duration
Burns from walking barefoot on hot pavements	
Wearing inappropriate inflexible bathing shoes	

\*In comparison with those with other types of neuropathic foot lesions

holiday may help prevent this serious complication. Patient education should emphasize the hazards of holidays in high-risk patients.<sup>[12,13]</sup>

### CONCLUSIONS

The risk of foot ulceration is increased in people with diabetes during holidays, particularly in hot regions during the summer season. Furthermore, diabetic patients with high risk for foot ulceration due to neuropathy may face similar risk while at home. These two cases highlight the lack of knowledge of the patients regarding foot self-care, which might have been contributed by the fact that they did not have regular follow-up with their health-care provider.

The risk could have been reduced by intensified education about foot care hot weather seasons both at home and away. Foot ulcers are preventable and not inevitable.

### Declaration of patients' consents

The author certifies that he obtained all appropriate patients' consent forms. In the forms, the patients had given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and all due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

### Authors' contribution

Single author responsible for conception, drafting and approving of the article. Images were shot by the author.

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### Conflicts of interest

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### Compliance with ethical principles

No prior ethical approval is required for single case reports and small case series provided the patient(s) give consent for publication.

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