ORIGINAL ARTICLE

Diabetic Foot: a preliminary study

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Abstract
Diabetic foot ulcer causes serious disability and considerable strain over the scarce resources of the patients in our community and country. The objectives of the study were to identify the risk factors of diabetic foot in patients admitted in the surgical ward at the Western Regional Hospital, Belize; to monitor the management of diabetic foot ulcer in said hospital and the outcome of those patients. **Material and Methods** Twelve patients admitted to the surgical ward with diabetic foot problems were interviewed, examined and studied. Patients were examined for peripheral pulses, sensations and body mass index determined. All patients admitted to the surgical ward of the Western Regional Hospital for diabetic foot ulcer receive treatment with metronidazole and a third generation cephalosporin. More than half of the patients get discharged after debridement. During their hospital stay, treatment and outcome were observed and recorded. **Results** Of the 12 patients studied, 5 (41.7%) were women and 7 (58.3%), men. Half of the patients (50%) were over 60 years. Ten (83.3%) of them had type 2 diabetes and 2 (16.7%) were type 1 diabetics. Awareness about risk factors causing diabetic foot problems was lacking among all patients. Glycaemic control was poor in six patients (50%); fair in 5 (41.7%) and good in only one (8.3%). Most patients were overweight (58.3%). More than half of the patients, 66.7% , never received education about foot care for diabetics. Nine patients (75%) were on oral hypoglycaemic agents; two (16.7%) were treated with insulin, while one (8.3%) was not receiving treatment. Duration of diabetes was greater than 10 years in 9 of the patients. Six patients were more than sixty years-old. The main cause for diabetic foot ulcer was blisters and burns in 50.0% of the patients. In two patients, the cause was unknown and in two patients each, they were trauma and ingrown toe nails. All patients received more than one antibiotic. In two patients (16.7%), foot ulcers healed only by conservative management; seven patients (58.3%) were subjected to debridement and desloughing; and one each to toe amputation, trans-metatarsal amputation or below knee amputation. Nil had above knee amputation. **Conclusions** Lack of education, poor glycaemic control, duration of diabetes mellitus for more than 10 years and male sex were the main risk factors for diabetic ulcers. This study also confirmed that microvascular complications should be screened for in patients with diabetic foot ulcers. Foot care education would be a most important way of dealing with this major problem. Non-compliance to treatment is the major risk factor for amputation.

Key words
Diabetic foot ulcer, diabetes mellitus, antibiotic treatment, debridement, amputation

■ INTRODUCTION

Diabetic foot ulcer (DFU) causes serious disability and considerable strain over the scarce resources of the patients in our community and country. The amount of money spent on DFU is not known due to lack of studies. However, an admission for diabetic foot averages eight days of hospitalization at Western Regional Hospital (WRH).

The percentage of diabetic patients affected with DFU in Belize is unknown. However, in the United States foot ulceration affects around 15% of diabetics with the risk of amputation being 15–40 times higher than in non-diabetics. In USA alone it accounts for 30,000 lower extremity amputations each year, around 20% of all hospital admissions of diabetics and costs more than 200 million dollars per year.

■ MATERIALS AND METHODS

A preliminary observational study was carried out at the Western Regional hospital (WRH), Belmopan, Belize. Twelve patients admitted at the hospital were studied. The history of each patient was recorded in detail on a survey sheet that included: sex, age, body mass index (BMI), duration of diabetes, type, cause of the ulcer, treatment and outcome. Pedal pulses were assessed for patency of circulation and graded as: a) strong, b) weak, c) absent. Vibration sense was checked for neuropathies by using a 256Hz tuning fork, touch sensation was assessed by a monofilament pressed perpendicularly to the feet against several sites including plantar aspects of the first toe, the first, third and fifth metatarsal heads the plantar surface of the heel and dorsum of the feet. The filament was not applied to any callus sites and the response of the patients in both methods was categorized as: a) no feeling (absent) vague feeling (diminished), c) proper (normal). BMI was calculated and categorized into four grades: underweight <19; normal, between 19–25; overweight, between 25–30; and obese >30. Glycaemic control was measured by fasting blood sugar (FBS) recorded in the charts by the ward nurses. FBS up to 120mg/dL was

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considered good, fair (between 121–40mg/dL), and poor (above 140mg/dL). Use of antibiotics and other treatments was recorded and outcome was assessed on the basis of how patients were discharged.

■ RESULTS

Of the 12 patients studied, 7 (58.3%) were male and 5 (41.7%), female. Age distribution showed that 2 (16.7%) were less than 40 years old, 4 (33.3%) were between 40 and 60 years of age and six (50%) were over 60 years old (Figures 1 and 2). Most patients were overweight: two patients were obese and

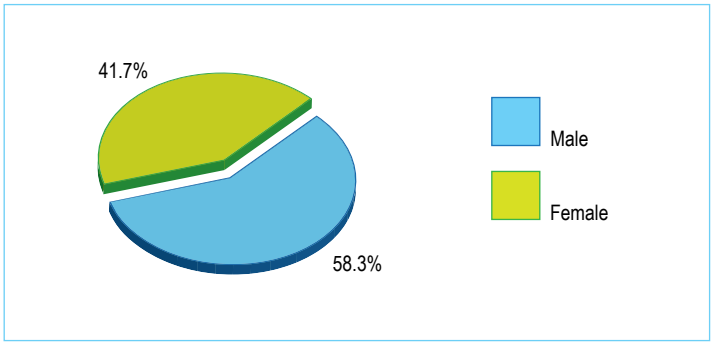

Figure 1. Distribution of the patients by sex

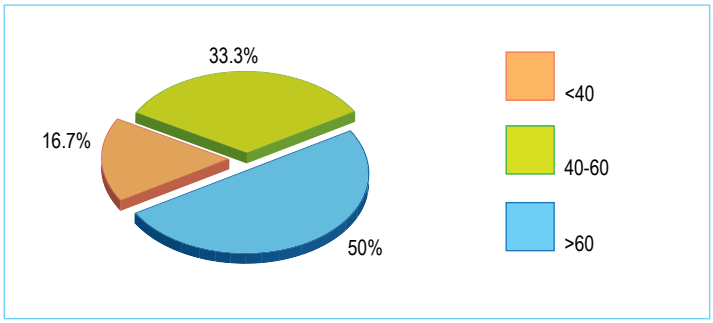

Figure 2. Patient distribution by age

five were overweight for 58.3% of the patients; only three had normal weight and two were underweight (Figure 3). As can be observed in Figure 4, only two (16.7%) patients had

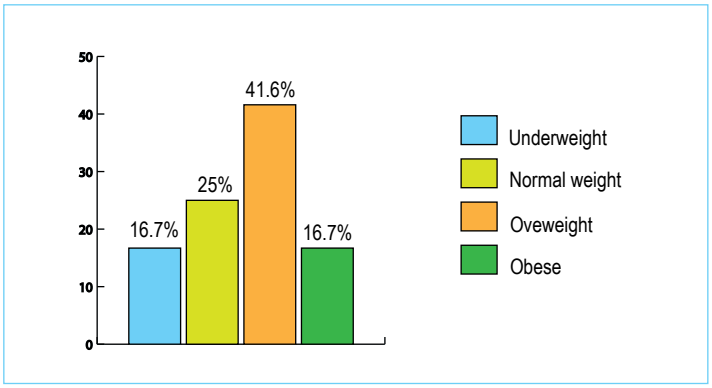

Figure 3. Body mass indexes of the diabetic patients

type 1 diabetes mellitus (DM). Nine patients had diabetes for more than ten years (since diagnosis) (Figure 5).

Most patients (9 or 75%) used oral hypoglycaemic drugs; two

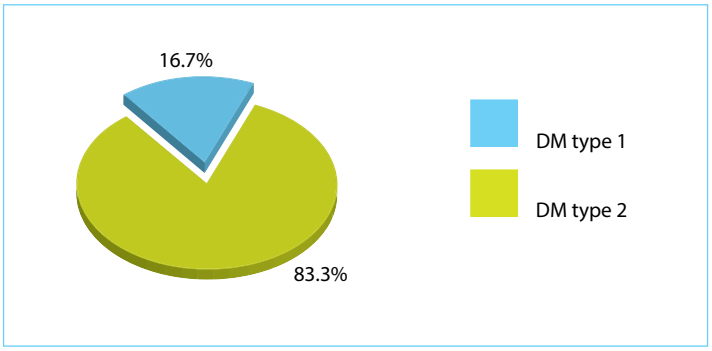

Figure 4. Type of diabetes mellitus (DM)

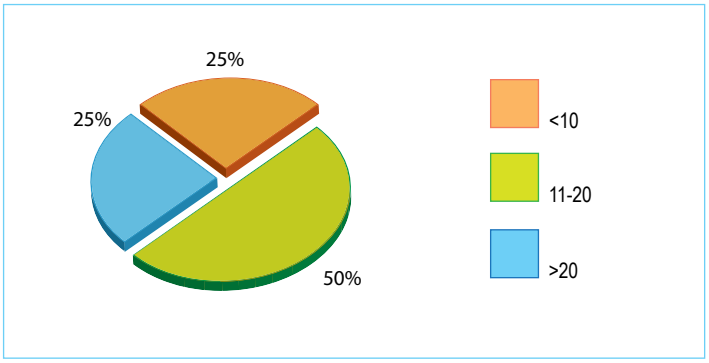

Figure 5. Duration of the disease in years

(16.7%) were on insulin and one (8.3%) was not taking any medication. DM control was not adequate in most patients (Figures 6 and 7).

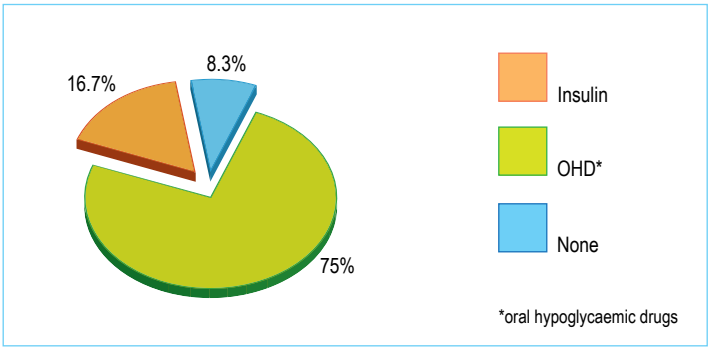

Figure 6. Medications used by diabetics

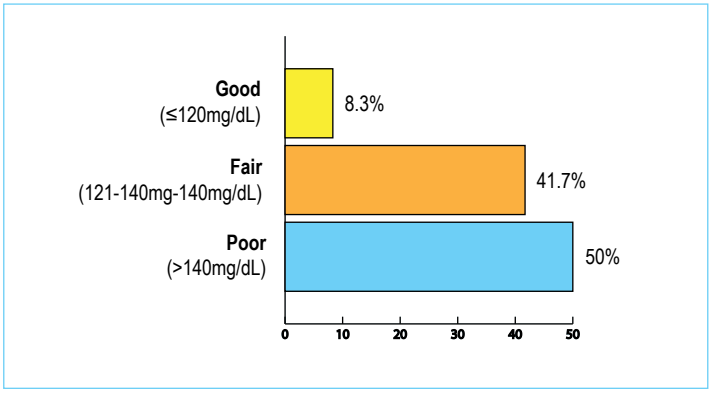

Figure 7.Glycaemic control by fasting blood sugar

The main cause for DFU was blisters and burns in half of the patients (50%). In two patients (16.7%), the cause of ulceration was unknown and, in two patients each, they were trauma and ingrown toe nails. The cause of the diabetic foot ulcer was unknown to two (16.7%) of the patients; in 50% it was blisters/boils; in 17%, trauma and in 17%, an ingrown toe nail (Figure 8).

On physical examination, sensation was intact in 16.7% of the patients and diminished in 83.3%. Pedal pulse was weak in all patients.

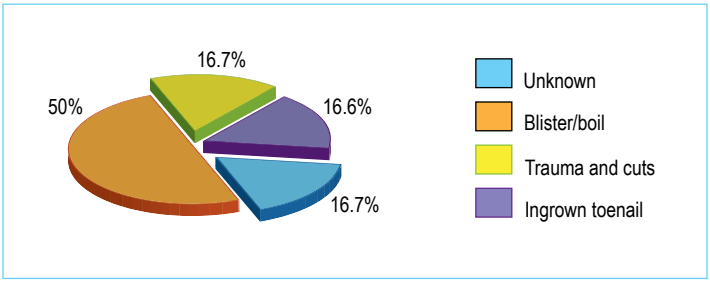

Figure 8. Cause of the diabetic foot ulcer

Double intravenous antibiotic therapy with metronidazole and a third generation cephalosporin was administered to all patients. Eight patients (66.7%) were given ceftriaxone and four (33.3%), ceftazidime.

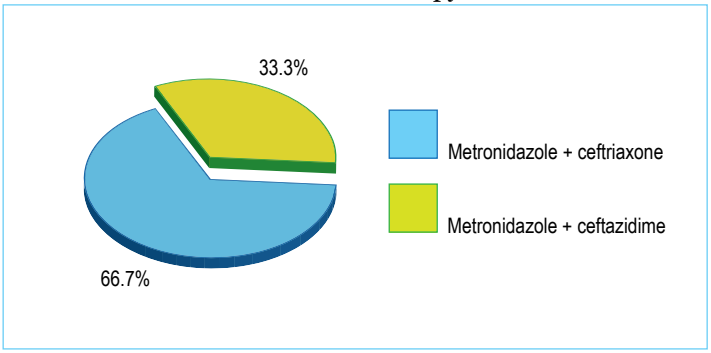

Figure 9. Antibiotic therapy administered to patients with diabetic foot ulcer

No surgical procedure was necessary in two patients (16.7%), in 7 (58.4%) debridement/ desloughing was performed; and one patient each (8.3%), had toe, trans-metatarsal or below knee amputation (BKA). No patient in the study required above knee amputation (AKA).

The only BKA performed was in a patient who did not adhere to treatment. At KHMH, according to a study carried out in 2014,(3) amputations for DFU were carried out in 89% of the patients, which is significantly higher in comparison with 25% at WRH.

■ DISCUSSION

This study highlighted the fact that there was almost total lack of awareness about foot care in our diabetic population. Other important aspects in relation to foot ulceration are glycaemic control and duration of diabetes. Nine patients suffered diabetes for more than ten years (since diagnosis); while six patients had poor glycaemic control. Poor glucose control, duration of diabetes over ten years and male sex are all significant risk factors for foot ulceration and risk of amputation increases 2 to 4 fold with both age and duration of diabetes. Two of our patients had ischaemic ulcers and eight had neuro-ischaemic ulcers. The remaining two patients had severe cellulitis ad ulcerations that interfered with exploration and classification.

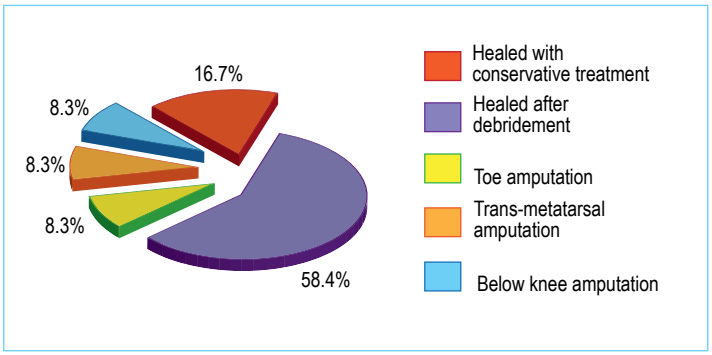

Figure 10. Treatment outcome at the Western Regional Hospital

Most of the patients at WRH are discharged after debridement. Below knee amputation was performed in one patient who did not adhere to treatment.

At KHMH according to an unpublished study carried out in 2014,(3) amputations for DFU were performed in 89% of the patients, which is significantly high in comparison with 25% at WRH.

Although our study reflects preliminary findings about DFU patients, their treatments and outcomes at WRH,

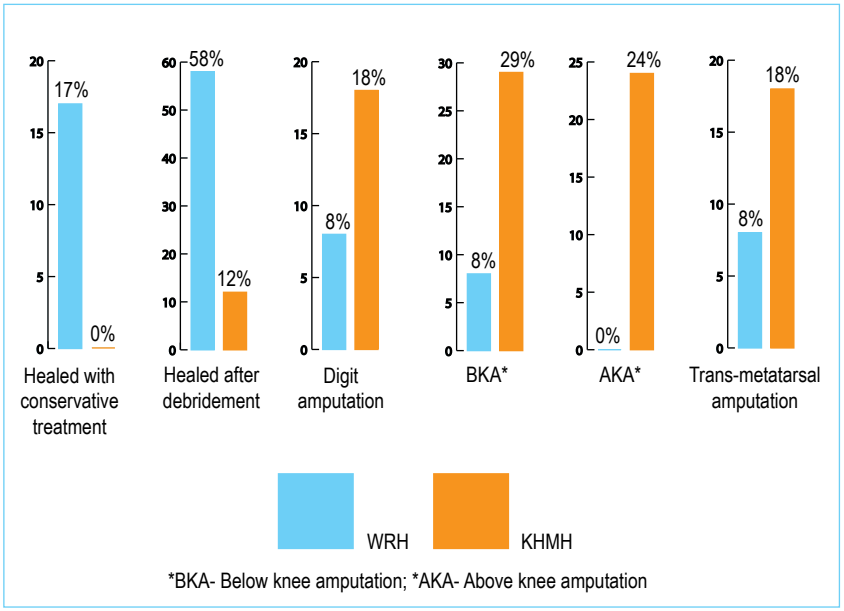

Figure 11.Comparison of treatment outcomes at Western Regional Hospital (WRH) and at Karl Heusner Memorial Hospital (KHMH)

its limitation is the small number of cases. Work should be continued to have more accurate findings that enable interventions to improve patient's care.

■ CONCLUSIONS

Lack of education, poor glycaemic control, DM for more than 10 years and male sex are the main risk factors for diabetic ulcers. Non-compliance with treatment is the major risk factor for amputation. All patients admitted to the surgical ward at WRH for DFU receive treatment with metronidazole and a third generation cephalosporin. At WRH there is a 25% chance of amputation when admitted for DFU ; however, above knee amputation is highly unlikely.

Pie diabético, un estudio preliminar

Resumen

La úlcera del pie diabético causa una discapacidad grave y una considerable presión sobre los escasos recursos de los pacientes en nuestra comunidad y país. Los objetivos del estudio fueron la identificación de los factores de riesgo del pie diabético en pacientes ingresados en el servicio quirúrgico del Western Regional Hospital, en Belice; observar el manejo del pie diabético en los pacientes de dicho hospital y el resultado. ***Material y Métodos*** *Se entrevistaron, examinaron y estudiaron 12 pacientes ingresados en el servicio quirúrgico con problemas de pie diabético. En los pacientes se examinaron los pulsos periféricos y la sensibilidad y se determinó el índice de masa corporal. Todos los pacientes ingresados en el servicio quirúrgico del Western Regional Hospital por pie diabético reciben tratamiento con metronidazol y una cefalosporina de tercera generación. Más de la mitad de los pacientes son dados de alta después del desbridamiento. Durante su estancia en el hospital, los tratamientos y sus resultados fueron observados y registrados.* ***Resultados*** *De los 12 pacientes estudiados, 5 (41,7%) eran mujeres y 7 (58,3%) hombres. La mitad de los pacientes (50%) tenían más de 60 años. Diez (83,3%) de ellos tenían diabetes tipo 2 y dos (16,7%) eran diabéticos de tipo 1. Entre los pacientes había falta de conocimiento acerca de los factores de riesgo que causan el pie diabético. El control glicémico fue insuficiente en seis pacientes (50%); aceptable en cinco (41,7%) y bueno, solamente en uno (8,3%). La mayoría de los pacientes tenían sobrepeso. Más de la mitad de los pacientes, el 66,7%, nunca fue instruido sobre el cuidado de los pies en los diabéticos. Nueve pacientes (75%) eran tratados con hipoglucemiantes orales, dos (16,7%) con insulina y uno (8,3%) no recibía tratamiento. La duración de la diabetes fue de más de 10 años en 9 de los pacientes. Seis pacientes tenían más de 60 años de edad. La causa principal de úlcera del pie diabético fueron ampollas y quemaduras en 50.0% de los pacientes. En dos pacientes, la causa fue desconocida, en otros dos pacientes fue por traumatismo y en dos más por uñas encarnadas. Todos los pacientes recibieron más de un antibiótico. En dos pacientes (16,7%), las úlceras del pie diabético se curaron sólo con tratamiento conservador; siete pacientes (58,3%) fueron sometidos a desbridamiento y eliminación de esfácelos; uno a amputación de un dedo del pie, otro a amputación trans-metatarsiana y uno más a amputación por debajo de la rodilla. Ninguno requirió amputación por encima de la rodilla.* ***Conclusiones*** *La falta de educación, el insuficiente control de la glucemia, la duración de la diabetes mellitus durante más de 10 años y el sexo masculino fueron los principales factores de riesgo para las úlceras diabéticas. Este estudio también confirmó que se deben examinar las complicaciones microvasculares en pacientes con úlceras de pie diabético. La educación sobre el cuidado de los pies sería la forma más importante de abordar este serio problema. El incumplimiento del tratamiento es el principal factor de riesgo de amputación.*

Palabras clave

Úlcera del pie diabético, diabetes mellitus, tratamiento con antibióticos, desbridamiento, amputación

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Drowning can occur hours after swimming

• By Robert Preidt. August 1, 2017 From: HealthDay News

While it happens rarely, a person can drown on dry land hours after having been in the water. Know the signs of dry and secondary drowning, expert cautions. There are two types of such drowning, dry drowning and secondary drowning, explained Dr. Jessica Lanerie, an associate professor at the Texas A&M College of Medicine.

"These are sometimes used interchangeably, but they are very different," she said in a school news release. "Dry drowning typically happens minutes after submersion, when water reaches the vocal cords and causes them to spasm, which blocks off the airway.

Secondary drowning happens within 24 hours after leaving the water," she added. In secondary drowning, water gets into the lungs and remains there for several hours, triggering inflammation that can lead to blockage of the lower airways and difficulty breathing. Secondary drowning is extremely rare, and is more common in children than adults. Signs of secondary drowning in someone who was submerged or accidentally swallowed water include: fast breathing; trouble breathing; vomiting; lethargy; exhaustion, lack of energy; frequent urge to sleep; and a lack of desire to eat or drink.

"The big keys to identifying secondary drowning are looking for respiratory troubles," Lanerie said. "If your child is vomiting, has difficulty breathing and is sleeping or is struggling to stay awake, then seek emergency care. On the other hand, it's common for children to get sick, so if it's just a cough, then you may just need to call your health care provider to schedule an appointment."

A child who had a near-drowning experience should be taken to an emergency department and monitored to ensure there is no lung damage, Lanerie said.

Source: Texas A&M College of Medicine, news release, July 21, 2017