

Original Article

The risk factors for development of a diabetic foot in asymptomatic diabetics

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Abstract

Objectives: Neuropathy, ischaemia and foot deformities are the main predisposing factors for development of a diabetic foot. Screening asymptomatic diabetics may reveal early preventable predisposing factors of foot ulceration.

Methods

One hundred diabetics presenting to Jabir Abu Eliz Diabetic Centre (JADC) for routine follow up at the medical clinic were studied. The feet were examined for neuropathy, ischaemia and deformities. Patients were educated about the significance of these findings and were instructed about foot care and wear as required.

Results

The mean age was 55 +/- 12 yrs and M:F ratio was 1:2. Sixty percent of patients had diabetes over 10 yrs and 90% were Type II Diabetes mellitus. Sixteen percent of patients had relative lower limb ischaemia as shown by an ankle/brachial index (A:B index <0.9) and 50%

had sensory neuropathy. More than 50% had foot deformities.

Conclusion

There are significant findings in asymptomatic diabetics related to the development of the diabetic foot. All patients attending a diabetic clinic should be screened for predisposing factors leading to the development of the diabetic foot and counseled. It remains to be seen how future follow up will result in better care and outcome in those patients.

Keywords: Diabetes, Neuropathy, Ischaemia, Diabetic foot

Introduction

Major lower limb amputations in Khartoum Hospitals were reported to be between 35 – 40% among inpatients admitted with a diabetic foot during the eighties⁽¹⁾ and this figure still valid in the year 2000⁽²⁾. The triad of ischaemia, neuropathy and foot deformities form the basis of development of the diabetic foot. Several studies have shown that amputation rate can be reduced by more than 50% if certain strategies being followed^(3,4). JADC in Khartoum has a unique set up where medical patients are seen regularly with adjacent foot care services.

The aim of this study was to report on the incidence of predisposing factors for the diabetic foot in asymptomatic diabetics

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attending the medical clinic for routine follow up. Advice on general diabetic management and foot care and wear was given to all patients in structured manner

Patients and Methods

This is an observational cross sectional hospital based study conducted in the medical clinic of JADC. Patients were informed about the aims of the study and their consent was given. All patients were examined by the author according to a clinical protocol data base that included general clinical assessment. Neuropathy was diagnosed when there was impaired sensation to a 10 gm monofilament nylon or loss of vibration sense to a 120 Hz tuning fork. Limb circulation was assessed using a Doppler ultrasound recording Ankle/Brachial index with a score >0.9 considered as normal, <0.9 up to 0.7 as diminished and <0.7 as critical. Foot deformities were listed and checked besides foot care was graded as good or bad.

Results

A 100 consecutive diabetics attending the medical diabetic clinic outpatient were included. The mean age was 55 +/- 12 yrs (Age +/- Standard Deviation) and the male to female ratio was 1:2. Thirty percent of patients were illiterate and 40% had intermediate level of education. Sixty five patients were housewives. Ninety patients were Type II Diabetes mellitus and 10 were Type I Diabetes mellitus.

60% of patients were diabetic for more than 10 yrs.

50% of patients weigh between 60 – 80 kg ms while 30% weigh more.

74% of patients had a positive family history of diabetes, most of them (71%) having first degree relative. 18% had a diabetic relative who undergone major lower limb amputation.

Only two patients had previous major lower limb amputation, another two had toe amputation and ten patients gave a history of a previous foot ulcer.

Regarding glycaemic control, only 7% of patients had HbA1c below 8 g/dL and 20% had readings above 10. 33% experienced previous attack of diabetic ketoacidosis.

24% of patients were hypertensive. 30% of patients had a cholesterol level between 200 – 240mg/dL and 20% had readings above 240 mg/dL. Only 12 patients were smokers.

Perfusion: Symptomatic lower limb claudication was found in 5 patients. Lower limb circulation as assessed by palpation revealed that the posterior tibial arteries (left & right) were of good pulsations in 50% (left side) and 55% (right side), diminished in 24 and 26% and critical is 21 and 23% of cases. The dorsalis pedis was good in 71 (left side) and 74% (right side), diminished in 19% and absent in 21 and 23% of cases. Using the Doppler ultrasound, the ankle /brachial index was >1 in 41%, 0.9 – 1 in 43%, 0.7 – 0.9 in 14% and 0.5 - 0.7 in 2%.

Transcutaneous oxygen was normal in 98% and was less than 65 mmHg in 2 patients.

Neuropathy: Sensory neuropathy as tested by 10 gm monofilament nylon was normal in 50%, diminished in 32% and absent in 18%. 20% of patients lost their vibration sense as tested by the tuning fork 128 MH. 17% had resting tachycardia >100 beats/min. and 3 patients had Charcot joint.

Foot deformities: 85% of patients wear open shoes while 15% wear closed ones. Table 1 shows the types of foot deformities and Table 2 shows the nail deformities and callus deposition. 30% of patients had nail deformities and 5% had inter- digital fungal infection. 45% had pes planus and 25%

hallux rigidus. Clawing toes was found in 43% and curly toes in 25%. Prominent

metatarsal heads were found in 15% and planter callus in 14%.

Table 1: Foot deformities found in asymptomatic 100 diabetic patients

Deformity	Right	Left
Pes cavus	15	15
Pes planus	45	45
Hallux vagus	10	6
Hallux rigidus	25	21
Hallux flexus	3	3

Table 2: Toe deformities, prominent metatarsal heads and callus formation

Toe deformities	Right	Left
Claw toe	43	41
Curly toe	25	24
Quintis varus	2	1
Crowding toes	4	5
Prominent metatarsal heads	15	14
Callus formation	14	12

Discussion

The majority of diabetics being screened were in their fifties, of the NIDDM type and have the disease for more than 10 yrs, which is in line with other studies abroad⁽⁵⁾. Illiteracy and low educational level among diabetics indicates indirectly lack of awareness of disease complications and preventive measures. Introduction of both specialized foot clinics and structured educational program has positive impact in reduction of foot problems and ulcerations^(6,7). Poor glycaemic control is manifested by repeated attacks of ketoacidosis in 33% of patients and high readings of HbA1c. This is known to be a

potentially modifiable risk factor for development of peripheral vascular disease⁽⁸⁾ and progression of neuropathy⁽⁹⁾. Hypercholestromia is reported in 20% of patients which is also an additive risk factor for development of the diabetic foot⁽⁷⁾. A past history of foot lesion or a family history of limb amputation were both associated with the development of the diabetic foot. Systemic hypertension which is reported in 20% of the patients is also a risk factor for development of peripheral vascular disease⁽¹⁰⁾. It had been reported that each 10 mm Hg increase in systolic BP is associated with 25% increase risk of peripheral vascular disease^(8,11). Vascular ischaemia predicts

delayed wound healing and ultimate amputation^(12,13). Readings of A/B index greater than 1.15⁽¹⁴⁾ indicated false results due to medial calcification and measuring the transcutaneous oxygen tension has been found to be more helpful, readings greater than 30 mmHg predicts ultimate healing⁽¹⁵⁾. Peripheral neuropathy is a major predictor of foot ulceration via loss of sensation, abnormal gait⁽¹⁶⁾, limited joint mobility⁽¹⁷⁾, development of Charcot joint⁽¹⁸⁾ and foot deformities and callus deposition^(19,13). It had been shown that patients in the podiatric care group had more knowledge of foot care and less callus than in the control group⁽²⁰⁾. The development of neuropathy can be delayed significantly by maintenance of glycaemic control^(12,19). However, only 4 patients had their feet being checked in the medical clinic by the treating physician prior to this study stressing the need for such simple foot inspection by the treating doctor. The association of significant renal affection with elevated serum creatinine above 1.2 mg/dL was noted in 7 patients. While eye affection is more commoner, 41% wear glasses and 28% had cataract indicating poor vision and more proneness to injury,

however other reports found no association⁽¹³⁾.

The use of ill fitting shoes was stressed as an external precipitating factor was reported in 80% of cases⁽²¹⁾. While those using specially manufactured shoes reported significant reduction in foot ulcer relapse after one year in patients than in controls (27% versus 58%). Foot care and educational intervention has a three fold risk reduction as compared to those who did not receive such guidance⁽⁵⁾. Foot wear facilities and expertise are far lagging in our set up and needs more development.

Primary health physicians must be educated about simple screening of diabetic feet. A multi disciplinary clinic is ideal but is difficult to avail in third world countries. However, a structured short course is essential to demonstrate foot deformities. In JADC we set a screening clinic run by specialized diabetic nurse. All diabetics attending the medical clinic are channeled to have a screening session. The clinic had been advertised to all hospitals in Khartoum State to refer diabetics for screening. It remains to be seen how those diabetics will fare in future follow up.

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